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EDITORIAL.

A SURE INDICATION that the business of the country is not falling off to the extent which Wall Street would have us believe, is found in the complaints made by coal operators of insufficient car-supply. These come both from the East and the West, where difficulty is found in shipping coal from the mines as fast as desired. During the past two years nearly all railroads have made large additions to their motive power and rolling stock. Yet they seem still to find difficulty in moving promptly the freight offered them. That transportation facilities should still be overtaxed hardly shows declining trade.

AN INTERESTING discovery of cobalt-nickel arsenides in northern Ontario is very fully described and discussed in another column by Professor Willet G. Miller, provincial geologist of Ontario. This discovery possesses much interest, from geological and mineralogical points of view, although it is not yet determined whether it will add to any considerable extent to the nickel production or resources of Ontario. It is quite probable, however, that the deposits will prove to be of some economic value.

ON ANOTHER PAGE we quote a portion of an interesting speech on technical education made by Mr. Hennen Jennings at the recent annual dinner of the Institution of Mining and Metallurgy, in London. Incidentally, we congratulate the Institution and Mr. Jennings upon his election to the presidency, for it is certain that no man stands more steadfastly for the best interests of the mining industry. It is a pleasure to chronicle the fact that so representative an American has been honored with the titular headship of the mining engineering profession in London.

THE DISCOVERY OF COPPER, announced as having been made in the Himalayas, illustrates how the search for the great conductor of electricity has stimulated modern mineral development. From the shores of Lake Tanganyika, in the center of Africa, to the frozen tundras of the far North, and from the sunburnt deserts of Australia to the highest mountain range in Asia, there is active and successful exploration for copper. While mountains are regarded as the culminating lines of geological uplift, and are usually associated with mineral wealth, it remains a fact that the aspiring peaks of the Himalayas have not, as yet, played any important part in modern mining; their mineral production is insignificant when compared to the Andes or to the North American Cordillera.

THE OUTLOOK FOR tin mining in Alaska is improving. Lode tin has been found in the Lost River district, about 30 miles east of Cape Prince of Wales. The tin occurs in a dike of granite traversing lime-

stone. Prospecting is now going on at this locality, and the outlook appears to be good. The reconnaissance work of the United States Geological Survey indicates that the distribution of tin in the Seward Peninsula is wider than supposed, although the occurrence of placer tin has only been proved in the creeks at York, and in the valley of the Snake river, 100 miles east of York and about 20 miles inland from Nome. The cassiterite is grayish brown to black, and is more often confused with magnetite than with garnet. Even tourmaline has been mistaken for tinstone by prospectors unfamiliar with the mineral. With better knowledge and more extended search, it is likely that the United States may again include tin among its important metallic products.

OUTSIDE OF ALASKA the only tin mining in the United States at present is found at Gaffney, in the northwestern part of South Carolina, near the North Carolina line. The first shipment, amounting to 20 tons, of tin ore from this Gaffney deposit has just been made by S. S. Ross, the ore going to England. This deposit is a continuation of that at Kings Mountain, in North Carolina, which was opened 15 years ago by Mr. Richard Eames, Jr., and which at that time produced some high grade cassiterite.

THE SOUTHERN BLAST-FURNACES.

While the blast-furnaces of the Central West have been seriously reducing their production to meet the assumed requirements of a period of declining consumption, the Southern furnaces have made but little change in their output. In the Pittsburg district and in the Mahoning and Shenango valleys, where the greater part of the production is of bessemer pig, the capacity of the active furnaces for December will show a reduction, estimated at nearly 40 per cent, from the high point reached earlier in the present year. Possibly—quite probably, indeed—this reduction has gone too far, and reviving demand, after the opening of the new year, is very likely to prove it; especially if no attempt is made to keep prices of iron at too high a level.

In the South, however, though there has been some talk of a general reduction, the actual falling off in output has been comparatively small. The iron-makers have apparently preferred to take what business there was going, at lower prices, to blowing out their stacks and trying to secure higher figures for a smaller output. The indications are that this will prove the better policy. It is true that some of the Alabama furnace-owners lost their heads for the time, and took business at lower prices than might have been obtained, had there been less of a scramble for orders; but they got what they wanted, and will keep their furnaces in blast. And even now, though prices seem low in comparison with those of a few months ago, they are far better than they were during the years of depression. We can all remember the times when No. 2 Alabama foundry sold at $6.50 per ton at furnace, while gray forge was placed as low as $5.75. At those prices, the ironmasters claimed that they were, at least, losing no money. That this claim was true was abundantly proved. Costs of all kinds, including wages and fuel, are higher now than they were in 1894 and 1896; but $9. or $9.50, for No. 2 foundry, though it seems low after the boom, is 50 per cent over the price of five years ago, and should afford at least a small profit. At this, too, the furnaces keep up their organizations and their full working forces, and are ready to take business when it comes.

We are not by any means prepared to say that this is not the wiser course; especially if, as we believe, the depression in the trade is temporary, to a large extent. No new boom is to be looked for, of course; but the country is not poor, and the chances are that a great deal of construction work will be done, and much iron will be called for next year. Already it is intimated that foundry iron is getting scarce, and that even a slight increase in demand will cause many hurried calls upon the blast-furnaces.

It is a notable fact that the Southern iron companies have, for the most part, adhered to their old policy of selling their product as pig iron. The steel works and rolling mills at Ensley remain about the only conspicuous exception. The making of basic open-hearth steel there has been successful, as well as the rolling of rails. These works are the only plant in the United States where rails are being made from basic steel, and almost the only one in which open-hearth steel is used for rails at all. They have already several orders for next year, and there is no reason why they should not do a good business. But the example has not been followed elsewhere, to any extent, and the Tennessee Coal, Iron & Railroad Company is still the only steel maker in the South which is working on a large scale.

Apparently the Southern iron-makers think that their interest lies in remaining the chief purveyors of foundry iron, and in disposing of their product in its simplest form, rather than in the investment of further capital to convert it into steel and finished products at home. Herein, we believe that they are mistaken. The example set at Ensley, however, may in time work a change. The results there may stir up others to abandon the too conservative course to which they have adhered so long.

However this may be, it looks very much as if the old claim of the Alabama iron-masters—that they could keep at work when no one else could, without losing money—would be renewed, even if the depression should prove to be deeper and more lasting than we now anticipate.

THE LABOR PROBLEM IN SOUTH AFRICA.

The Report of the Special Commission which was formed for the purpose of studying the labor conditions in the Transvaal, and of proposing suitable measures for relieving the present difficulties, has been made public at last; and it is matter for regret that there is also a minority report which gives expression to a division of opinion. While the majority finds the native labor supply inadequate for the industrial needs of South Africa, there is a suggestion from the minority that unskilled white labor should be employed. This is likely to furnish material for further controversy regarding the advisability of importing coolies from China and elsewhere, with the result, we fear, of causing the Report to be less decisive in its effect than it otherwise might have been.

In order to facilitate the work of the Commission, the South African Chamber of Mines undertook an investigation of the general status of labor, and has brought out some interesting facts, which probably will be included in the Commission's report. It has been conclusively established that native laborers cannot be obtained in sufficient numbers to meet the requirements of the mining and other industries of South Africa. According to the Chamber of Mines, the number of natives now employed in the Transvaal, Orange River and Cape colonies is 197,598, while the present needs may be estimated at 350,714. A census of the territories opened to recruiting shows that there are only 235,611 able-bodied males, between the ages of 15 and 40, available as laborers, or only a few thousand more than the number in actual service. Apparently the situation can be relieved only by the importation of Chinese or coolie labor, and this is the view practically taken by the Chamber of Mines.

At the recent sessions of the Labor Commission one of the mine managers held up the drift of public opinion in favor of the importation of Asiatics by claiming that he had made a successful trial of white labor at a property under his charge. He proposed to pay 8s. 6d., or $2.04, per day, but it is most unlikely that, so long as the expenses of living continue high, such a wage will attract white labor to South Africa. Moreover, it appears that he was working a fairly high-grade mine and was not sorting his ore; as a consequence, the profits went down from £27,000 to £13,000 per month. A prejudice was created by a comparison with before-the-war conditions, but this was misleading by reason of the fact that the mine had been notoriously badly worked under a former management. This instance is quoted simply as an example of the discussions which have been holding the attention of our professional friends in the Transvaal. After all, it is not a theory, but a condition, which confronts South Africa to-day, and, in the face of the brutal actualities of fact, all doctrinaire notions must perforce give way.

The facts concerning the situation are sufficiently impressive; thus, the nominal issued capital of the various mining, finance and land companies aggregates £211,967,247, or, say, a billion and a half dollars; there are 3,120 stamps compulsorily idle for want of laborers in the mines, and this number of stamps is supposed to represent the loss of an earning capacity equal to $20,000,000; moreover, the average profit per ton under existing conditions is put at 11s. 6d., or $2.76, per ton, while with all the stamps at work the profit is estimated to be 15s., or $3.60 per ton.

While the scarcity of labor prevents those mines which are going concerns from reaching, and then maintaining, a maximum scale of output and profits, it is also crippling the Transvaal by impeding the development of new gold-bearing areas. This branch of mining activity has been paralyzed in consequence of the inability to secure workmen for the opening up of the deep-level claims which formed the basis for company promotion on a colossal scale. It is the shareholders in these undertakings who are the severest sufferers. When the full resumption of operations does take place, a vigorous effort will doubtless be made by the big financial houses to excite interest in the deep-levels away off on the dip of the Main Reef series, and they will float off their holdings of such areas, which now represent the most indigestible of securities.

We had hoped that the decision of the Commission would be favorable not only to the importation of foreign labor—for that must come inevitably—but that its findings would include recommendations which would be unanimous. The division of opinion rendered evident by the Report is all the more regrettable since it will renew the interminable debate concerning the advisability of employing one kind of labor—the unskilled white—of which there is no sufficient supply to be secured, as against another class, the coolie of Asia, of which there is an abundant amount available. This result of the Labor Commission is likely to delay further the amelioration of industrial conditions in South Africa.

It will be an event of the first magnitude when the present uncertainty, which is crippling the development of the Transvaal and its adjoining regions, gives place to a definite policy. Having regard to the scarcity of labor in several mining regions—Mexico, for example—and the excess of population in certain parts of the world, such as China and India, it is to be hoped that practical eco-

nomics will adjust the disparity and that it will take the form of an importation of foreign labor such as will stimulate the industry of one region while mitigating the poverty of another; for this question is of vital interest not only to investors in the mining companies and to the technical men employed by them, but also to the civilized world at large, because it affects the production of gold, whose vitalizing influence on commerce is keenly felt everywhere.

NATIONAL MINING LEGISLATION.

Several bills have been introduced in Congress for the better regulation of the mineral industry. One of these has been read twice and referred to the Committee on Mines and Mining, so that there is some probability of action being taken. Senator Gamble, of South Dakota, stands sponsor for this measure, which provides more particularly for the establishment of "mining experiment stations" in "each of the mineral States and Territories."

The bill (No. 271) now before Congress strongly resembles one which was introduced before the recent session of the American Mining Congress, an organization whose chief strength lies in its name. Like other measures advocated by that convention, there is a strong tone of paternalism about all the provisions advocated in this latest attempt to assist mining, and in this respect there is a similarity to the latest developments in mining legislation which have been put into effect in the Commonwealth of Australia. In that island continent the different States in varying measure distribute prospecting grants to encourage exploration; erect "government batteries," that is, custom mills maintained at public expense in order to stimulate local mining; they endow government schools of mines, maintain public analysts and assayers, and take sundry other methods of aiding an industry which contributes so largely to the prosperity of the country. There is much difference of opinion as to the utility of this expense; some of it is wasted, some of it has proved eminently useful. On the whole, it can be said that where schools of mines, mills, assay offices, funds for prospecting and the like are not forthcoming as a part of private or corporate enterprise, then it is well enough for the government to extend the fatherly hand of financial assistance. It is quite another matter when such measures are advocated in a community quite able to make proper provision for these fundamental needs of a mineral industry.

By Mr. Gamble's bill, every mining experiment station is to have an "expert geologist, at a salary of three thousand dollars per annum; also one competent and experienced chemist, at a salary of two thousand per annum." Under section 3 it is further provided, "that it shall be the duty of such geologist and chemist appointed under this act to receive for assay or analysis all rock, cement, clay, or other mineral-bearing substance that may be brought to them by any citizen of the United States, and make a proper classification or assay of each sample of rock, cement, clay, or other mineral-bearing substance, for the purpose of ascertaining the exact amount of gold, cinnabar, silver, copper, wolfram, tin, or any other mineral known for its value in the arts and sciences or used in commercial transactions, and to furnish, at a nominal charge, to be regulated by the Secretary of the Treasury, to each depositor of rock, cement, clay, or other mineral-bearing substance, a full assay or analysis, showing the quantity and quality of each and every mineral found in said rock, cement, clay, or other mineral-bearing substance so examined by them."

When not occupied in this manner, "the said geologist shall personally explore and carefully examine the mineral regions within his jurisdiction, and especially at points of new and recent discovery," and so forth.

We venture to point out that the duty of geological exploration committed to this proposed official is already allotted to the United States Geological Survey; and while the latter is unable, chiefly by reason of lack of funds, to make such preliminary examinations as promptly as is sometimes desirable, there is every reason to believe that it can do so, if proper financial provision is made. If the bill under discussion becomes law, the appointment of these new officials will, by senatorial courtesy, devolve upon politicians, and it is likely to end, as such affairs generally do, in filling a scientific post with a quasi-scientific, semi-technical man, whose tenure of office will depend upon the exigencies of party politics.

Nor do we believe that the mineral industry will get much benefit from these added facilities for rock and mineral determinations. It is not difficult to get material examined; there is a great deal of camaraderie among the workers in the field of mining, and no man need despair of having an assay made or a mineral tested merely because he cannot furnish a fee. The real mineral seekers are not paupers, even when they are poor. On the other hand, such a government "expert geologist" and his official chemist would prove of inestimable assistance to all the fakirs of mining promotion; lacking the funds or being otherwise indisposed to pay a proper fee for a proper examination, they would only have to send a few specimens of the size of walnuts to the official chemist and a few rock specimens to the expert geologist to get all the data required to touch up a vast amount of flamboyant literature, and the unfortunate officials would become victims without the opportunity of extrication.

We cannot see how the placing of these Federal officials in the various States and Territories is going to forward the best interests of mining. It simply enlarges the sphere of political patronage. At present the States have their own geologists and commissioners of mines, and the Federal government has a well-organized geological survey.

It seems to us that these existing agencies will suffice if they are made more efficient. Take the State geologists out of politics, choose good men and appoint them for long terms, pay them a reasonable salary, and encourage them by affording facilities for the publication of reports; let them keep in touch with the national scientific corps of the survey, to the intent that there may be co-operation, just as at the present time, the State geologist of Colorado is working in harmony with an officer of the Survey in the examination of recent developments in the Cripple Creek district. Then, having given a good start to local geological research, turn to the United States Geological Survey, and deal with it in a spirit warranted by its splendid record; give it generous appropriations, reorganize its clumsy departmental arrangements, and endeavor to facilitate its operations so that valuable reports will not be held back until they become as obituaries and its important investigations will not be crippled by mere want of money to publish them.

We have State geologists and we have a National survey; the appointees suggested by Mr. Gamble will only make for confusion. Until some effort has been made to improve existing agencies for aiding mining, it would seem to us a blunder to create more.

Zinc may be called the youngest of the commercial metals. The ancient Greeks and Romans made brass by melting copper in crucibles with calamine and charcoal; but they did not separate the zinc as a separate metal from the ore. It is barely 100 years since zinc was obtained from the ore on a commercial scale, and is not 75 years since it was produced in any large quantity.

MARKET CONDITIONS.

December 9.

The metal markets generally have shown some improvement, and a better feeling is manifest.

Large sales of copper have been made at the low prices recently established, and manufacturers seem to be inclined to take hold again. This is especially the case abroad, where business is reviving, and the manufacturers' stocks have been very small. The European buyers seem to have made up their minds that bottom has been reached, and have placed a very considerable amount of business. The large sellers here have, moreover, ceased to press metal upon the market, with the consequence that prices are better. Stocks are not large anywhere, and it is quite probable that the upward turn has come sooner than was anticipated.

Tin has shown the usual fluctuations. While the demand here for consumption is only fair, spot is in short supply.

Lead shows a slightly better demand. The prices are unchanged, but spot lead is in rather short supply, and some premiums have been made for early delivery on small lots.

Spelter is a little stronger, or rather shows some resistance to further depression, and it begins to look as though the bottom prices for this metal had been approached.

Press despatches report that the Montana Legislature has passed the two measures asked for by the Amalgamated Company—the change of venue bill, permitting the transfer of pending litigation to a court outside of the Butte district; and the law providing for a review of the facts in equity cases by the Supreme Court. It is believed that the Governor will not approve these bills, but will probably allow them to become laws without his signature.

Silver has had a sharp fall, with some recovery, due chiefly to speculation.

In the iron market some more business is reported in pig iron, and a few contracts have been placed for delivery in the first quarter of 1904. Most business for next year, however, is still held back, and a large part of the trade has been for immediate delivery. Steel billets remain unchanged, with comparatively little doing. In finished material more inquiry is reported, but the market remains dull, so far as the actual placing of orders is concerned. It is apparent that buyers are still holding back with the expectation of securing concessions, and this, with the rapid approach of the end of the year, combines to make business very slow. It is a noticeable fact that the southern furnaces have been able to work off their accumulations of iron at the low prices recently quoted, and that they are now asking an advance on those prices and seem to be getting it.

In the western coal market the Lake trade is closing this week, with the shipment of a few cargoes needed to make up contract requirements. Lake navigation is still open, but any day may bring about difficulties, which will prevent the sailing of any more vessels. The steam coal trade in the west is quiet, although domestic business in the cities is pretty good. Some operators in Western Pennsylvania, Ohio and Indiana are talking about curtailing production, but nothing has been done so far. Transportation in the west is generally better.

In the seaboard bituminous coal trade, conditions show no change from last week. Business continues fair, but the transportation conditions are poor.

The anthracite trade is also quiet. In the West, stocks are so large that only a moderate all-rail business is expected through the winter. In the East, there is some increase in the inquiry for steam sizes of coal, but the demand for the prepared sizes, after showing improvement, has again declined.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

BROMO-CYANIDE.

The Editor:

Sir.—Mr. T. B. Joseph's letter in your issue of November 14 cannot be intended to be taken seriously. I am honored that Mr. Joseph, who is evidently, from his letter, without personal experience in the matter, should take me as his authority, although he is somewhat inaccurate or befogged as to the date of the publication of my book; but Mr. Joseph appears to have overlooked two facts: First, that my statement as to the price of bromo-cyanide referred to the price being paid at Kalgoorlie by the people interested in the process; and, second, that a "suggested" cheaper method of manufacture can scarcely be called a correction of an easily ascertainable statement of fact.

If Mr. Joseph, by means of the method suggested by me, is able to reduce the price of bromo-cyanide from, say, 90c. per pound to—I cannot say what figure, as Mr. Joseph suddenly appears to grow befogged and to mix up the price of bromo-cyanide per pound with the amount of bromine to be added to a ton of solution, two entirely different factors—let him by all means do so and grow rich on the proceeds! We shall all welcome any method whatever whereby bromo-cyanide may be cheaply and easily made; and if that suggestion of mine, to which Mr. Joseph refers, is found to assist in any way, I shall be only too happy and will promise to charge no royalty.

But if, instead of rushing into print to make a correction, Mr. Joseph had paused to verify the statement referred to, and had also sought to learn how much bromo-cyanide was actually required per ton of ore treated—apart from the price of bromo-cyanide per pound—his letter would probably not have been written. ALFRED JAMES.

London, Nov. 27, 1903.

MINING FINANCE.

The Editor:

Sir.—I hope that your articles on 'Mining Finance,' recently published in the JOURNAL, will be widely read, and will serve to give the public better ideas on that subject, and especially on the proper function of exploration companies. The public, even that portion which concerns itself at all about the subject, has very hazy ideas of mining finance. I have even met mining engineers, who were well up in their profession, but were rather like a sailor on horseback when it came to the financial part. If people, who have money to invest, would only look into this matter more, there would be fewer complaints about mining investments. How often we have seen fairly good mining propositions hampered by capital all out of proportion to their value; and, on the other hand, mines kept back in their development for want of money, which could be spent upon them.

I was specially interested in what you have said about exploration companies and their proper functions. The popular mind has been somewhat confused on this point. Quite a number of people, I find, have a general idea that an exploration company is something like the 'holding company'—that pernicious modern device, which has played such a malignant part in railroad and industrial finance, in the last two or three years. We have one conspicuous example of the 'holding company' in mining, which many investors know to their sorrow. The less said about it, the better; it is certainly not an exploration company.

The greater part of the public knows the exploration company only through the glowing advertisements of the promoters and stock peddlers, whose brilliant imaginations have seized upon the idea of exploration and finance companies, as capital devices to aid in fleecing the unsuspecting outsider. The very titles are alluring, and they permit the use of gorgeous prospectuses, unhampered by any regard for truth. If the promoter has one particular mine to describe, he finds inconvenient limitations; the possibilities of finding an indefinite number give his mendacity full scope. But this is inevitable, since all good things may be perverted to evil ends; and it does not destroy their real usefulness.

It does not seem to me that we have ever had a really satisfactory mining market in this country. I do not mean by this a mining stock market, but a market in which mines, or good properties, can be disposed of in a satisfactory way. The prospector, or the mining engineer, who has a promising mineral property, needing capital for its development, often does not know where to go. If he has no friends with money, it is not an easy matter to secure his capital or dispose of his property. Too often he falls a victim to the promoter or to a broker of the conscienceless class, who reaps all the profits. The exploration company—or companies, for there is room for more than one or two—of the right kind, would help very materially in making the market that is wanted. Such companies, too, when well established, would be in a position to command the attention of investors, large and small. Of course, they will be liable to make mistakes sometimes; but, with any sort of good management, the proportion of such failures will not be large.

I hope you will be able to develop further these ideas, which I have expressed in what, I fear, is a rather inconsequent way. I want to see general investment in mines increase; for I know that, if reliable ways of doing it are provided, such investments will be far better for the public than the putting their money into blind pools and watered industrials. INVESTOR.

New York, Dec. 6, 1903.

THE DEPOSITION OF ORES FROM AN IGNEOUS MAGMA.

The Editor:

Sir.—With reference to Professor Kemp's interesting letter on the above subject in the JOURNAL of November 28, I am afraid little good can be got from a general discussion on such a wide and varied subject, and I would recommend that a special case be submitted. Being of the opinion that most of the magmas we meet, especially throughout the mountain ranges of the Pacific coast, are aqueous-igneous magmas, which have gone through various stages of differentiation to reach the condition in which we find them, I am compelled to accept the theory of pegmatitic veins. Whether they be the result of an expiring effort, or an after-birth, it is almost certain that the magmas we find extruding themselves in the upper portion of the earth's crust are not the primary magma, which at one time must have covered the molten nucleus as a boiling, steaming mush, containing the oxides, sulphides, chlorides, etc., of nearly all the metals which formed that nucleus, but a secondary magma produced from sedimentary deposits. Taking for granted the truth of the nebular hypothesis, that the molten nucleus was enclosed in a thick vapor containing all the minerals (or their constituents), which, at present, compose the solid crust of the earth; that this vapor condensed into a boiling mush, which was afterward overlaid by sediment derived by aqueous solution from that mush; then later on that sediment was broken up and overlaid by that boiling mush beneath it; then denuded by steaming liquid, and again overlaid by the secondary sediment, and so on, until the crust became so thick and tough that it yielded like rubber to the pulsations of the magma beneath it; uplifts would be going on along lines of least resistance, and waves would be formed in that tough crust due to tidal action, which would become fixed as the covering became cooler and harder. In the meantime the hollows would fill with a steaming liquid, which by waves would cut down those soft hillocks, and so gradually build up strata capable of supporting and developing vegetable life. When the steaming liquid became sufficiently cool to allow of the growth of corals and encrinites, there would be produced the limerocks, which would be overlaid with other strata, such as the Carboniferous, of a highly non-conductive character for heat; consequently, the heat of the primary magma would in time raise the temperature of the limestones to, say, 500° C. A little moisture from above would cause eruptive action, and down the cracks so formed would rush the mineral water, filling the hollows on the surface, and a secondary magma would be produced. Now, I have abundant proof to show that most of the eruptive rocks, such as granite, syenite, trachyte, and the lavas in all their various forms, even basalt, are produced from this secondary magma. And that is what I call an 'igneous-aqueous magma.'

Now, if you care to restrict the discussion to a special case, I shall be very pleased to furnish one which came under my observation lately in northwestern Alaska, and which is typical of the magmas associated with the precious metals through the whole Pacific coast range of mountains from Patagonia to Bering strait, which I know from personal experience during thirty years. ROBERT STEVENSON.

New York, Dec. 2, 1903.

RESUING IN UNDERGROUND WORK.

The Editor:

Sir.—The article appearing in your issue of September 12 referring to the origin of the term 'resue' as applied to underground work, brings to mind some practical experiments carried out by the writer a few years ago, in which an attempt was made to determine the relative merits of this system of dealing with narrow veins of high grade, as against the method of breaking the reef and adjoining rock together with an idea of sorting out a high percentage of the non-auriferous product. In the cases cited the adjoining rocks, or walls of the vein, contained no gold values, the inclination of the vein was 85° from the horizontal, and the section of footwall taken out in the first instance was separated from the vein by a clear plane and was broken without disturbing the ore. The average width of heading or breast in the first operation was 30 in. and the total width of stope after the reef had been extracted was 36 in. In the second operation the maximum average width of stope was 30 inches.

The two methods were applied as follows:

When resuing was applied, the vein was first stripped on the footwall (which, in this case, was the more economical to handle) to a width of 30 in. This waste rock was used largely as filling, although a certain percentage was necessarily sent to the surface. When some 3,600 sq. ft. of quartz had been stripped, this was broken down as a clean product, so that no sorting was required.

In the second case, the quartz and adjoining rock were broken together and the fineness to which this product was reduced allowed of sorting out only 5 per cent of the barren rock.

The following figures are compiled from these experiments, and although the period over which the work was extended was of necessity limited, and is possibly not an absolute guide as to what the work should cost under similar conditions over large areas, they indicate the most profitable method of handling ore occurring under these conditions.

Example A shows a loss of $23.76 on the operations, while in B, where resuing is resorted to, a profit of $1,469.40 is made. In both cases 6 in. of quartz was dealt with.

In the second comparison, C and D, a 12-in. vein valued at 30 dwt. was worked, and while the discrepancy is not so marked, it is shown that under these conditions there is still a considerable margin in favor of resuing. The last example, E, is purely theoretical, as far as the percentage sorted is concerned, and is given in further support of the contention held.

Comparisons Between Stripping Narrow Reefs and Stoping Them with Waste.

Example A.—Width of reef, 6 in.; value, 50 dwt. Stoping width, 30 in.; value 10 dwt. One ton contains 20 per cent of reef and 80 per cent of waste; 5 per cent is sorted, 5 per cent of 80 per cent is 4, leaving 76 per cent of the waste. So that 96 per cent goes to the mill with a value of 10.41 dwt. per ton. Recovery equals 75 per cent of 10.41 dwt.; that is, 7.8 dwt. at $0.96, which is $7.49. One hundred tons at $7.49 is $749. On a basis of 100 tons milled it is necessary

To mine 104 tons at	$3.60	$374.40
" tram 104 " "	0.36	37.44
" hoist 104 " "	0.18	18.72
" mill 100 " "	1.44	144.00
" redemption ... "	0.72	72.00
" charges, general "	0.66	66.00
" pumping ..... "	0.60	60.00
Total expenses for 100 tons		$772.56
Value of gold recovered, 100 tons		748.80
Loss		23.76

Example B.—Stripping 30 in. of waste and mining 6 in. of clean reef. Width of reef, 6 in.; value, 50 dwt. per ton. Recovery, 75 per cent of 50 dwt.; that is, 37.5 dwt. at $0.96, or $36. On a basis of 100 tons at $36, $3,600, it is necessary

To mine 500 tons of waste, at $2.40	$1,200.00
" mill 100 tons of reef, at $3.60	360.00
" handle 110 tons of waste, at $0.48	52.80
" tram 100 tons of reef, at $0.36	36.00
" hoist 100 tons of waste, at $0.18	19.80
" hoist 100 tons of reef, at $0.18	18.00
" mill 100 tons of reef, at $1.92	192.00
" redemption, at $0.96	96.00
" charges, at $0.84	84.00
" pumping, at $0.72	72.00
Total expenses for 100 tons	$2,130.60
Value of gold recovered, 100 tons	3,600.00
Profit by stripping:	$1,469.40

Example C.—Width of reef, 12 in.; value, 30 dwt. per ton. Stoping reef and waste together. Average value of 30 in., 12 dwt.; 40 per cent of this is reef; 60 per cent is waste; 5 per cent is sorted, equal to 3 per cent of the waste; leaving 97 per cent to mill, averaging 12.4 dwt.; 75 per cent recovery of 12.4 dwt. is 9.3 dwt. per ton. Value of gold in 100 tons (9.3 dwt. at $8.93) is $893.

	Tons.	Cost.	Total.
Mining	103 at	$3.60	$370.80
Tramming	103 "	0.36	37.08
Hoisting	103 "	0.18	18.54
Milling	100 "	1.44	144.00
Pumping	100 "	0.60	60.00
Redemption	100 "	0.72	72.00
Charges	100 "	0.66	66.00
Total expenses for 100 tons			$768.42
Value of gold recovered			892.80
Profit			$124.38

Example D.—Stripping 12-in. reef. Value, 30 dwt.; 75 per cent recovery, is 22.5 dwt., or $21.60. Value of gold in 100 tons at $21.60 is $2,160.

	Tons.	Cost.	Total.
Mining waste	250 at	$2.40	$600.00
Mining reef	100 "	3.60	360.00
Handling waste	23 "	0.48	11.04
Handling reef	100 "	0.36	36.00
Hoisting waste	23 "	0.18	4.14
Hoisting reef	100 "	0.18	18.00
Milling	100 "	1.92	192.00
Pumping	"	0.72	72.00
Redemption	"	0.96	96.00
Charges	"	0.72	72.00
Total expenses for 100 tons			$1,461.18
Value of gold recovered			2,160.00
Profit			$698.82

Example E.—Width of reef, 12 in.; value, 30 dwt. per ton. Stoping reef and waste together, 30 in. wide, and then sorting 20 per cent of the rock mined. Value of rock before sorting, 12 dwt.; after sorting, 15 dwt.; 75 per cent extraction gives 11.25 dwt. recovery; 100 tons at 11.25 dwt. at $0.96 equals $1,080.

Expenses.

Mining 125 tons at $3.60	$450.00
Tramming 125 tons at $0.36	45.00
Hoisting 125 tons at $0.18	22.50
Sorting 25 tons at $0.96	24.00
Milling 100 tons at $1.44	144.00
Pumping 100 tons at $0.60	60.00
Redemption 100 tons at $0.72	72.00
Charges 100 tons at $0.66	66.00
Total expenses for 100 tons	$883.50
Value of gold recovered	1,080.00
Profit	$196.50

These figures reflect the importance of carefully weighing the merits of the two methods of stoping when dealing with narrow veins.

F. C. ROBERTS.

Buluwayo, Rhodesia, Oct. 27, 1903.

RE-GRINDING MACHINES.

The Editor:

SIR.—Referring to your article on 'Re-grinding Machines' in the issue of November 21, I have had not a little experience in working quartz ores, and the question of fine grinding appears to me to be about as it was twenty years ago, notwithstanding the many new machines that have been devised.

Rolls cannot be relied upon for long use, as it is impossible to make them wear smoothly so as to fit, on their entire faces, closely enough to grind evenly. Ball-mills are apt to wear in grooves after a little use.

Huntington mills will not do at all for quartz rock, whether fine or coarse, when fed to them, and my experience has been that they are the most expensive of all mills to keep up, and the sooner they go to the scrap-heap the less the expense of maintenance.

That leaves only the stamp-mill and the Chilean mill as reliable machines. The stamp-mill, of course, is standard, but it has many drawbacks for very fine grinding. For secondary work, therefore, my experience has been that the Chilean mill, though slow in operation, is the most reliable and most satisfactory in the long run. W. W. CRISSON.

Dahlonega, Ga., Nov. 29, 1903.

NOTE.—The ENGINEERING AND MINING JOURNAL is desirous of obtaining certain back numbers and volumes, and would be willing to pay a liberal price for them. Those wanted are Volumes 53 and 54 (1892), complete; No. 19 of Volume 51 (May 9, 1891); Nos. 3 and 24 of Volume 60 (July 20 and December 14, 1895); the Index to Volume 63 (1897) of the ENGINEERING AND MINING JOURNAL. Anyone having any of these numbers to dispose of will oblige by informing us as soon as possible.

HERBERT SPENCER.

The great philosopher died on December 8. His work endures, his memorial lives in his sane and courageous writings. We quote one passage from the 'First Principles' which embodies the philosophic justification of his useful life:

"Whoever hesitates to utter that which he thinks the highest truth, lest it should be too much in advance of the times, may reassure himself by looking at his acts from an impersonal point of view. Let him duly realize the fact that opinion is the agency through which character adapts external arrangements to itself—that his opinion rightly forms part of this agency—is a unit of force, constituting, with other such units, the general power which works out social changes; and he will perceive that he may properly give full utterance to his innermost conviction, leaving it to produce what effect it may. It is not for nothing that he has in him these sympathies with some principles and repugnance to others. He, with all his capacities, and aspirations, and beliefs, is not an accident, but a product of the past. He must remember that while he is a descendant of the past, he is a parent of the future; and that his thoughts are as children born to him, which he may not carelessly let die. He, like every other man, may properly consider himself as one of the myriad agencies through whom works the Unknown Cause; and when the Unknown Cause produces in him a certain belief, he is thereby authorized to profess and act out that belief. . . . Not as adventitious, therefore, will the wise man regard the faith which is in him. The highest truth he sees he will fearlessly utter; knowing that, let what may come of it, he is thus playing his right part in the world—knowing that if he can effect the change he aims at—well; if not—well also; though not so well."

IRON MAKING IN CHINA.—At present there is one blast-furnace in operation in the Chinese Government Works, at Hanyang. This furnace makes 75 tons of pig iron a day, using in the year some 50,000 tons of iron ore and limestone from Ta-Yeh and about 100,000 tons of coal and coke, which is brought from the Ping-Hsiang mines, in Hunan. The steel works are now turning out about 2,500 tons of bessemer ingots and 500 tons of open-hearth ingots per month.

CONDITIONS IN THE CLEARFIELD REGION.

EDITORIAL CORRESPONDENCE.

There was a time, not very long ago, when the grades of bituminous coal known as Clearfield, which figure so largely in the market at New York harbor points and at Philadelphia, came actually, for the most part, from Clearfield county, Pennsylvania, the coal which made the name of Clearfield famous being mined near Houtzdale and Philipsburg, from the Moshannon vein. Nowadays, however, Clearfield coal is simply that which gets the Clearfield rate from the Pennsylvania Railroad or the equivalent from any other roads. The Clearfield rate of the Pennsylvania applies to coal shipped to tidewater from points east of Latrobe, which is 37 miles east of Pittsburg. So it happens that Clearfield coal is now shipped in quantities from Clearfield, Cambria, Indiana and Somerset counties, and the name means nothing as to quality, since, in those counties, there are mines working at least three different veins besides what is known as the D vein, the equivalent of the Moshannon. The term Clearfield, however, still has value, since the output of the mines getting the Clearfield rate is largely coal that will not coke in beehive ovens, and is, for the most part, rather low in volatile hydrocarbons, ash and sulphur; being, in short, what is known as a good steam coal.

In the Clearfield region there is a great diversity of mine equipment, though the general plan of working the coal, owing to the very low dips of the beds, is practically the same, different mines using slightly different methods in practice to meet such conditions as the varying thickness of the coal-beds, variations in the rock overlying the coal, and the numerous gentle folds which, though of small vertical amplitude, necessitate changes in the direction of main roads and cross headings to permit of easy grades for underground haulage. These variations in mining practice and mine equipment will be noticed in some detail in another letter. The general conditions governing the working of the mines and the relations of operator and miner call for consideration first.

The process of consolidation and centralization, so marked a feature in the recent development of many great industries, is in progress in the Clearfield region of Pennsylvania, and within the last five years there have been companies organized which hold great tracts of land, or rather control the mineral rights. This, naturally, has resulted in a great advance in values. Thus, mineral rights which could have been had for $10 per acre, five or six years ago, are now held at $100, although the present rather depressed condition of the coal market has tended temporarily to check speculations in coal lands, and the formation of new coal-mining companies. Of the newer companies now at work, one has some 60,000 acres of well-located land, in a practically continuous tract, with a seam of coal of good thickness and quality. Another company holds even more, in the counties named, but its lands are a little scattered. The profit to be made from a 60,000-acre tract of coal land, land carrying 3.5 ft. to over 4 ft. of good coal, is something that people not engaged in coal mining, or familiar with its details, can hardly imagine. And here it may be said that, though the mines just now are not working very actively, Clearfield operators have no reason to lament. The daily press has given much attention to the profits, real and supposed, of the anthracite mining companies, but has had little to say of conditions farther west. The reason, of course, is that anthracite being a domestic fuel, a rise in its price is a matter that the public finds of general interest, while bituminous coal, in the regions where anthracite conditions are most discussed, is used by factories and railways, and what they pay for coal often does not interest even their stockholders.

Mining companies in the Clearfield district have had several good years, and most of them have had the opportunity to make handsome profits. Coal mining does not appeal to the imagination, as does gold mining, but the returns from it are far more

certain, and, in the aggregate, many times greater. Some idea of this difference may be had by comparing the value of the gold and of the coal produced in the United States last year.

Although certain companies in the Clearfield region control vast tracts of land, yet, as in other bituminous districts, there is not such a close union of interests, as is the case in the anthracite region. The workable territory is greater, and the capital required for opening a mine is smaller. Hence, there are, in spite of recent consolidations, many small mining concerns in the district. Some of these mines employ less than 10 men and supply local families with fuel. Others employ 20, 30 or 50 men, and ship by rail, say, 50 to 100 tons daily when running full time. As these small mines can scarcely work as cheaply as larger and better equipped mines, and—so the owners claim—do not get as liberal service from the railroads, it follows that the small companies work less regularly than the large ones, and, since the owners are often more exacting, have more trouble with their miners. Thus it happens that the situation differs greatly from that confronting the anthracite operators.

Probably most miners in the Clearfield district are members of the United Mine Workers. At a convention held at Altoona, annually, representatives of the miners, and of those companies that have yielded to the union, meet and fix prices for mining, and determine working conditions for the ensuing year. The large companies that recognize the union have an eight-hour work day and check-weightmen, and deduct from each man's pay the union dues, these being turned over to the union representatives.

The Berwind-White Company is the largest of those that do not recognize the union. It has a 10-hour work day, but pays its men the union rate per hour, thus making the daily wages higher than at unionized mines. Another company with large coal mines near Johnstown, the Cambria Steel Company, employs miners who are mostly non-union. The net result of this state of affairs is that, while petty strikes have been quite numerous, there has been no general strike in several years.

It is but fair to say that those companies that have recognized the union admit that recognition has not brought some of the evils that exist elsewhere under union domination, and that the appointment of check-weighmen has proved an advantage, in that disputes over the tonnage mined by any man are now between the individual miner and an official appointed by the miners' organization. The check-off on each miner's pay, turned over to the union at some mines, must amount to a goodly sum; at one group of mines, not one of the largest, it amounts to fully $1,000 each fortnightly pay-day, and is collected at no expense to the union. This alone is a sufficient reason for the United Mine Workers desiring to bring all mines under control of the organization, while its present inability to extend its influence faster in the face of the indifference of many miners, and the opposition of some operators, may explain why there seems little prospect of the union trying to increase its influence by ordering a general strike. It is, perhaps, fair to say that, had the same conditions of ownership prevailed in the anthracite region last year, as in the Clearfield; that is, had the Mine Workers been obliged to deal with many operators instead of the presidents of a few great companies, the anthracite strike would never have started, or would, at any rate, have had a different outcome. Centralization of authority has its defects as well as its advantages.

Johnstown, Pa., Dec. 5, 1903.

MINE ACCIDENTS IN HUNGARY.—In 1902 there were 9,626 persons employed in Hungary in mining coal and 25,913 in mining lignite. In the coal mines 21 persons were killed and 34 injured, and in the lignite mines 47 were killed and 110 injured. The fatal accident rates were, therefore, 2.18 and 1.81 per 1,000, respectively.

TECHNICAL EDUCATION.

We quote herewith a portion of a thoughtful speech made by Mr. Hennen Jennings at the annual dinner of the Institution of Mining and Metallurgy on November 25, in London, as reported by our esteemed contemporary, *The Mining Journal:*

"It is my main desire to make clear the part that this institution has taken, and is taking, in connection with technical education. Possibly the best way to lead up to my subject is by an examination of our list of members. In August of this year a new list with topographical index was issued, and from a study of this it is found that there are 498 members of all classes registered in the United Kingdom; 176 in Africa (South and West); 28 in Central and South America; 66 in the United States and Mexico; 96 in Australasia; 18 in Canada; 50 in various parts of Europe; 28 in India; and 54 in China, Straits Settlements, Borneo, East Indies, West Indies, Japan, Korea, Siam and Arabia, numbering in the world over a thousand in all. In examining the qualifications given by applicants for membership, it is found that a large proportion of our members have received

HENNEN JENNINGS.

early educational technical training either at the Royal School of Mines or other technical schools of Great Britain, or in various technical institutions of the United States, Canada and Australia. There is also a considerable number of members who have taken courses at the Freiberg School of Mines in Germany. Naturally, with this diversity of preparatory training, it would be strange if all members, even of your council, had identical views as to the details of the best possible way to train a metalliferous mining engineer or metallurgist. But, on the other hand, the fact that this institution draws its members from many parts of the world, and that they have had most varied practical experiences and theoretical training, and are by the nature of their calling great travelers, makes London—which is the center of financial activity—a very fitting and natural meeting place, allowing the exchange of ideas culled, not from small parishes, but from the world at large.

"Some two years ago the interest of your council was greatly stimulated by the evident desire of some of the authorities of the Royal College of Science to obtain some practical suggestions from our members as to how that college could best be made to meet the requirements for the training of the mining engineer and metallurgist under the ever-increasing demands brought about by competition with other countries, coupled with the fact that great strides have been made in all branches of industrial science. An enthusiastic committee of the council of this institution was appointed in December, 1901, with instructions to compare the system of technical training given at the Royal School of Mines with that existing in the United States and Germany, and to formulate their opinions and suggestions. This committee started with buoyant light-heartedness to deal with the seemingly simple concrete problem of the theoretical and practical training of students of one school of mines, but soon found that it had involved itself in the discussion of one of the most complex problems that it would be possible to bring before the institution. For it was found that the problem reached out into the broad fields of nationality, free trade, protection, technical progress and exigencies of our age, trade competition, and the various systems of general and technical education adopted in other countries. It was realized that during the past century, and at the present time, the power of a pair of hands has been constantly increased by having put in their grasp new devices and forces which augmented many fold their power of accomplishment over Nature. A concrete conception of this can be obtained by considering the total horse-power developed by steam alone and used in Great Britain, which was estimated as far back as 1896 by such an authority as Professor Kent to be equivalent to the work of 120,000,000 men. This is only in the department of steam, and thus does not include water-power, gas and oil engines, or the increased force given to man by increased knowledge through the discoveries and use of chemical action in various manufactures and explosives, this being too complex to even hazard a guess estimate. To utilize such forces to the best advantage, it was apparent that the average workman must have a different training from that received when he lacked such powers; and, if it were true that the workmen required a different training, was it not even more apparent that the training of the directors and leaders of these workmen should also undergo modification?

"Broadly speaking, the committee and council considered: That there was imperative necessity for the Central Mining and Metallurgical School of this Empire to be equal to the best institution of its kind in the world; that, where good might be accomplished by engrafting methods from other countries, it should be done, but they in no way recommended wholesale slavish imitation of other countries, which would be unworkable unless based on the same foundations. The great German educational system, though fostered by love of learning, is more or less founded on an autocratic 'must,' supported and stimulated by a military system which is a part of it. The United States educational system differs from that in vogue in this country in that it, too, rests far more in the hands of State government, and that it has sprung up unhampered by vested educational rights and customs, and is thus more free to absorb, without destruction or detriment, anything new that appeals to it elsewhere. Its higher technical institutions are also more utilitarian in their objects and more business-like in their methods.

"The school systems of both the United States and Germany are also far more democratic than in this country, the wealthy placing their sons under the same educational influence as the poor and struggling. Thus the primary, secondary, and in many instances the tertiary, education of these countries, especially the United States, permits a boy of ability—though having parents of slender means—to obtain the highest possible education the country can afford, starting from the learning of his alphabet up to graduation in the most exacting of the universities, with but very little, if any, expense for tuition, and without incurring obligations except to the government of his country.

"Democracy in school training has, I believe, a more far-reaching effect on technical education than may at first be supposed, for it brings the future employer and employed into intimate contact during impressionable and formative years in a way that is not otherwise possible, and gives maximum stimulant to the many for effort. With lack of intimate school contact in primary and secondary education it would appear that even greater effort should be made in this country to bring the future employer and employed in touch on a sound, intimate and stimulating plane in the final stage."

GOLD MINING IN RHODESIA.

By F. C. ROBERTS.

Introductory.—Lying between latitudes 16° and 23° south, and longitudes 25° and 30° east, Rhodesia, which, a few years ago, was almost wholly inhabited by the native tribes, can now boast of a white population of about ten thousand. The country derives its name from the great founder, Cecil John Rhodes. In its physical aspects Rhodesia differs from most of the western mining States of America, in that few really high mountain ranges traverse the country. The mining districts embrace numerous small hills which gradually fade away into large areas of, first, undulating and then almost flat, plains. In the granitic belts an independent type of scenery is presented, consisting of wide, slightly undulating plains, dotted with countless small conical hills (kopjes) varying in height from 50 to 300 feet.

In but one instance in the whole of Rhodesia has it been found advantageous to attack the ore-bodies and veins through adits; practically every mine in the country has been opened up through shafts. The gold mining industry at the present time is the only industrial source of revenue, and presents certain aspects difficult to compare with those existing in other countries. The vicissitudes to which Rhodesia has been subjected have been numerous, unique and costly; they have militated against the energy and enterprise which have been thrown into the country, the progress of which has been sadly retarded in consequence.

The internal system of railways, which is now being extended over the country, will bring within easy access of the centers, Buluwayo in Matabeleland and Salisbury in Mashonaland, every mining district of importance, and thereby remove the hindrance due to prohibitive prices and scarcity of wagon transport. An independent line, 200 miles long, which is practically the first lap in the Cape to Cairo railway, from Bulwayo via Victoria Falls, will tap the Wankie coal-field by the end of November. The Wankie coal will then be available for use in practically every mining district of Rhodesia.

Geology.—Geologically, those parts of Rhodesia which have been at all explored present much the same features as other quartz countries. In two instances, however, we are favored with geological problems which promise to be of especial interest and importance, and in both instances the commercial aspect of the inquiry will stimulate scientific investigation. I refer to an auriferous diorite in the one case, and auriferous hornblende porphyrite in the other.

No geological survey has yet been made in Rhodesia, hence only a generalized description is possible. By far the greater portion of the country consists of granite rocks, in wide belts, having a strike somewhat west of north and east of south. The gold belts embrace the areas characterized by slates and schists, varying in extent from a few hundred yards wide by half a dozen miles in length to 15 miles wide by 30 miles in length. These metamorphic rocks are traversed by numerous dikes, consisting of the many varieties of diorite. In the valleys, or small gulches, of the hill country, the alluvium is of very limited extent, suggesting a lack of those extreme climatic conditions necessary to produce rapid erosion.

The quartz veins include several distinct types; the most common are the interlaminated veins which are found abundantly in the foliated rocks, though numerous segregated veins also exist. The quartz occurs generally in lenticular bodies, sometimes distinctly isolated, but more usually in parallel series, exhibiting great variations in width and vertical persistence. On the whole, the veins are narrow and their lateral extent is rather limited.

At the Ayrshire mine in Mashonaland an auriferous diorite is under exploitation, but as yet little is known of the genesis of this most interesting occurrence. A large amount of work has been accomplished laterally, and the vertical depth reached is over 600 ft. The irregularity of the gold contents of the dike and various other characteristics would seem to support the lateral secretion theory.[1]

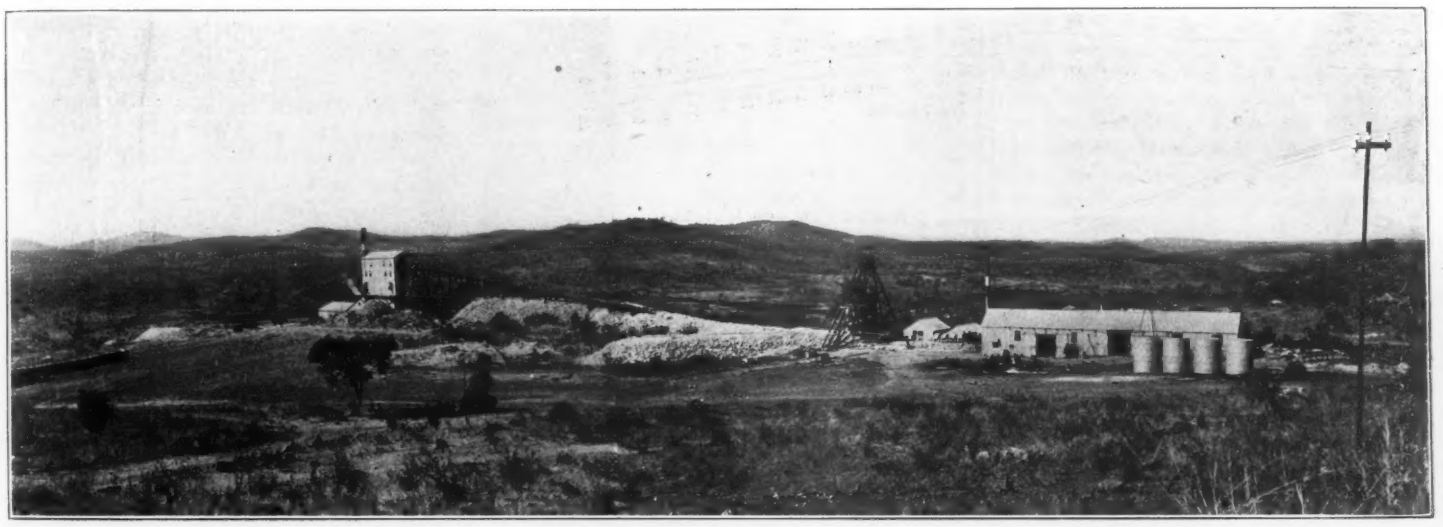
The writer has lately discovered an auriferous hornblende porphyrite. This rock is most interesting petrographically, and is quite uncommon in this country. It consists, as seen under the microscope, "of large crystals of feldspar (chiefly plagioclase), possibly with some orthoclase and smaller calcareous pseudomorphs after hornblende, retaining good crystal outline, imbedded in a fine-grained feldspathic ground-mass. The feldspars are somewhat crushed and the alteration of the hornblende implies a certain amount of water action." This body has recently undergone exploitation, and appears to predominate in the moulding of a small range of hills rising 500 ft. above the surrounding country. In close proximity to the porphyrite are the crystalline schists. A superficial examination shows considerable variation in width, the maximum being about 150 ft., while the lateral extent will probably reach 1,000 ft. or more. Enough work has not been done to decipher the geological structure, nor can an intelligent idea, as yet, be formed with regard to the origin of the gold contents. Samples taken over the various widths exposed give from 2 to 15 dwt. per ton, and although these results are not representative, they indicate an occurrence of unique character.

Ancient Workings.—An interesting feature of Rhodesia is the fact that every auriferous district has been largely worked by an extinct race, popularly referred to as the 'ancients,' and although some relics left by these people have been found in the bottom of old stopes lately opened, as well as among the numerous ruins existing in the country, no satisfactory explanation has been advanced touching their identity. The amount of work accomplished, and the quantity of gold, copper and iron extracted by them, must have been enormous. While the remains of these workings have largely aided the prospector during the modern reopening of the country, when conditions were more or less abnormal, there is little doubt that their effect has tended to hinder the introduction of a thorough system of prospecting, and has in a great measure deflected attention from the large areas containing virgin reefs. Several calculations of the amount of gold extracted by these 'ancients' have been made; these estimates are hypothetic and no accuracy is claimed for them, but the latest reach $300,000,000. It has been the custom to judge the value of a mining proposition in Rhodesia by the extent of the 'old workings,' without regard to geological considerations; hence many disappointments.

The knowledge displayed by the 'ancients' in determining the value of the ore was indeed marvelous. It is not to be assumed that they realized width of vein as an important factor, but it would appear to have been a sufficient encouragement to them that a vein contained, say, a minimum value of 10 dwt. per ton. This work no doubt extended over a very long period, for wherever the rock was not readily softened by weathering, they built fires against the stope-breasts and then threw water upon the heated rock so as to induce fracture. In some instances, where it is evident from the contours that water was not encountered, they worked to a depth of no less than 250 ft. on the dip.

Financial Considerations.—The British South Africa Company formerly had the right to demand up to 50 per cent of the vendor's interests, but this right was seldom exercised to its full extent; it has now been reduced to 30 per cent, and is generally satisfied by the transfer of the necessary number of shares in the new company.

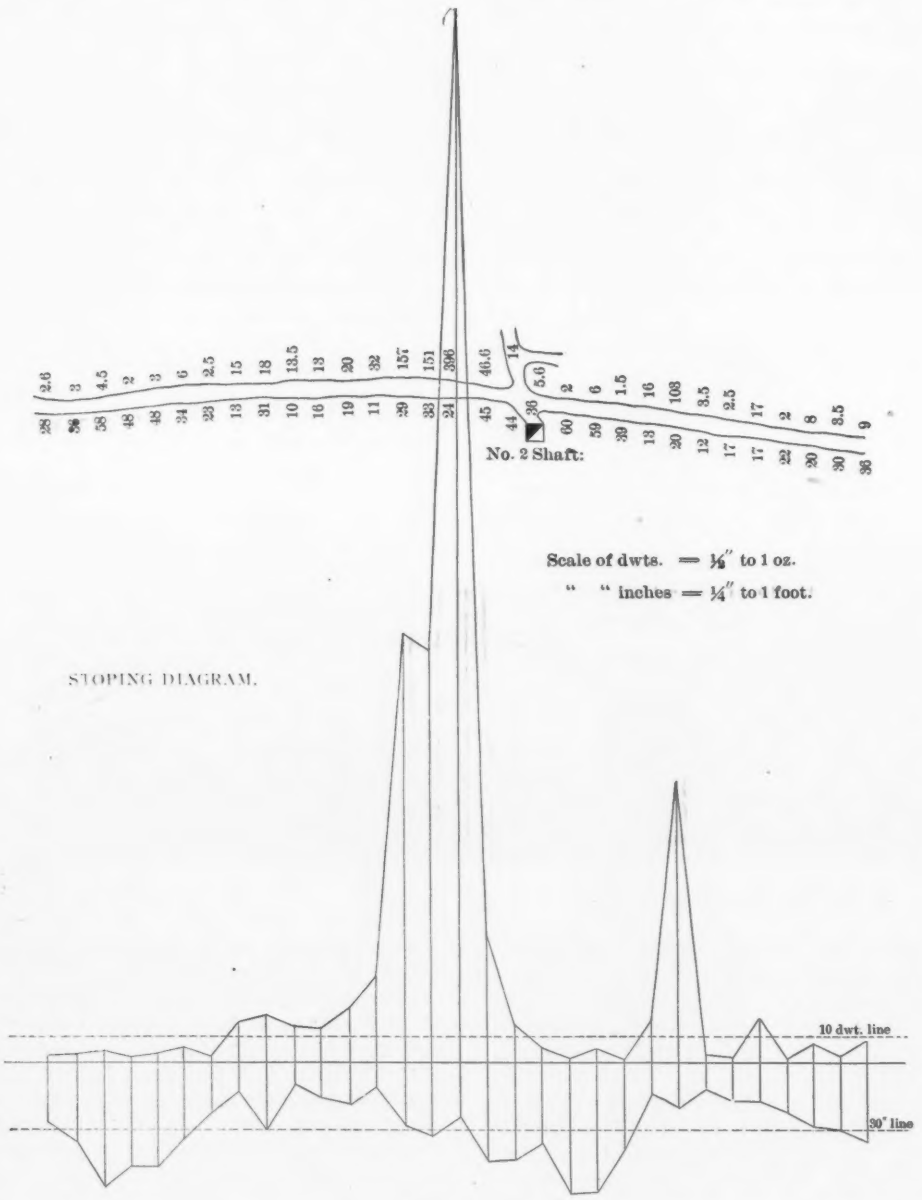
The *modus operandi* obtaining in Rhodesia, and adopted by practically every financial house having an interest here, includes many features which, to those unacquainted with the local conditions and the market considerations, would appear to cast an unnecessary burden of heavy capitalization upon the mines; but there are explanatory circumstances. A mining claim in Rhodesia embraces an area 150 ft. along the strike of the outcrop or old working, by 600 ft.; hence ten claims constitute a block 1,500 ft. by 600 ft., which is equal to the mining claim as defined by the United States Mineral Code. The other regulations contained in the Mineral Ordinance are



A TYPICAL RHODESIA MINE.

[1] The gold-bearing diorite of the Ayrshire mine was discussed in this JOURNAL, under date of July 11, by Mr. E. D. Berrington, and, on October 3, by Mr. J. E. Spurr.

really only modifications of the United States laws. What is termed the 'parent company' in Rhodesia is a limited liability company, with a capital of from $150,000 to $5,000,000, formed for the purpose of acquiring mines, lands, farms, etc., the latter being necessary in order to secure timber. At the present time the timber constitutes the only fuel of the country; the mining company pays a royalty of $1.20 per cord to the farm-owner. The number of claims controlled by these parent companies varies from 100, in small concerns, to as many as 5,000 in the larger companies. The object of the parent company is to carry out a system of prospecting and development work, with a view to placing independent properties upon the market. It is obvious that, in a



STOPING DIAGRAM.

country where development expenses are very high, there must be a limit to these operations; for if an attempt is made by the parent company to develop from 18 months to two years' supply of ore, upon a number of claims, it becomes impossible to finance the work; hence it is clear that the gold mining company must assume big responsibilities, and therein lies the key to many failures. The problems with which the parent company is faced are as follows:

(a) Capital and shares involved in purchase of property.

(b) Capital involved in prospecting and development work.

(c) Capital involved in installation of temporary surface equipment.

(d) Interest accumulating upon capital invested.

The chief considerations of the gold mining company are as follows:

(1) Capital involved in purchase of property from the parent company.

(2) Capital involved in development work.

(3) Capital or shares involved in commutation of Chartered Company's rights.

(4) Capital involved in purchase and erection of plant.

(5) Capital or shares involved in making provision for possible extension of plant.

Assuming a width of vein of 30 in., with the orebodies not too scattered, it becomes necessary to make provision for an expenditure of no less than $360,000, in order to bring a property to a milling stage and equip it with a 20-stamp mill, cyanide works, etc. This should, under ordinary circumstances, give 18 to 20 months' run of pay-ore. As a matter of fact, no mine in this country should commence the reduction of ore with less than three years' ore in such a state of exposure as to be reasonably counted upon to return a margin over and above the estimated working expenses, as it is next to impossible to keep the development work so far ahead of the reduction plant as the constantly fluctuating and inefficient labor-supply demands.

Assay Plans.—Upon most of those mines, which have reached an advanced stage of development, surface and assay plans, as well as section and stoping plans, are kept; while the data embodied in the plans vary somewhat on different mines, the fundamental principles are adhered to. The development assays as well as the stope-assays are taken at intervals of 5 ft., and plotted weekly. The pennyweights are shown in red and the width in inches in black. All samples are taken over the actual reef-width, which figures are adjusted to an assumed stoping-width in the assay-book.

In the opinion of the writer, the methods often used (when the width of reef is under an assumed stoping-width) of sampling over the stoping-width, embracing both reef and country matter, are liable to produce inaccurate results. It appears clear that where the character, hardness of the rock, etc., show a marked difference, it is almost impossible to obtain such a correct proportion of each section as to insure reliable results. These remarks are particularly applicable to this region, where so many small but rich veins occur, which, in many cases, have lent themselves more readily to oxidation than the enclosing rock. Sectional sampling is largely practiced, not only in development work, but at all stope-breasts, in order to avoid the handling of ore which will not leave a margin over mining and milling expenses. In this country the unit of value is the troy pennyweight, equal to about 4 shillings, or one dollar. In order that immediate approximations may be made of the stope-breasts, daily samples are taken and panned; these, after one has become familiar with the character of the gold, etc., furnish satisfactory results; but the results plotted always refer to fire-assays.

For the purpose of avoiding inaccuracies, the individual stopes are plotted to large scale upon separate blocks, and these are used for calculating tonnages. The usual scale for underground general plans, etc., varies from 20 ft. = 1 in. to 60 ft. = 1 in., depending upon the extent of the property.

Development Work.—Generally speaking, the quartz veins in this country may be said to be narrow. The lateral continuity varies greatly, and rarely exceeds the full length of a block (1,500 ft.); the grade (when the widths are adjusted to a common basis and suitable areas are used in calculations) ranges between 8 dwt. and 22 dwt. per ton.

At the Wanderer mine, where a dry-crushing plant of about 300-ton capacity has recently been erected, the average is under 5 dwt. per ton; in this instance no underground work is necessary, the ore being quarried. In common with other countries where the industry is only emerging from infancy, Rhodesian ventures have suffered by the erection of reduction plants before sufficient work has been accomplished underground. The period consumed in reaching the milling stage varies, of course, with the width and lateral continuity of the reef in each case, but it may be said that in Rhodesia it requires from three to four years from the date that work is initiated.

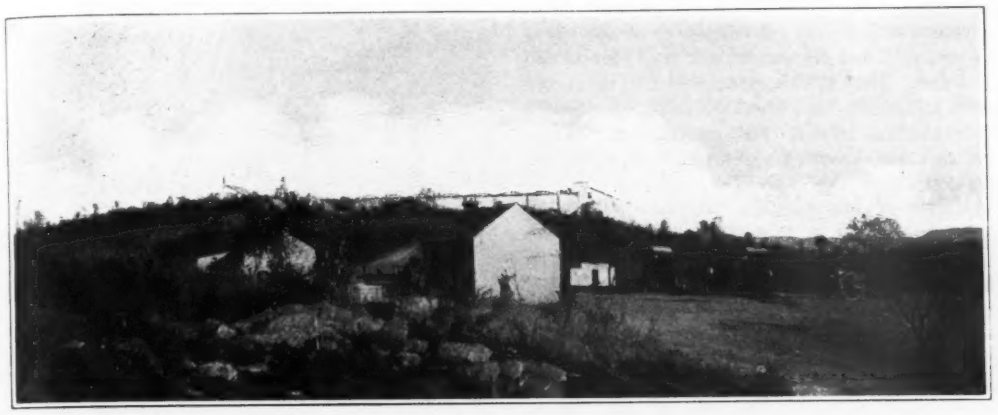
The comparative cost of unskilled labor would suggest, at first sight, that the costs of development work should be very low; this is not the case, however, for although the native wage seems low, when the other expenses incident to their employment are considered, it is found that they account for about 30 per cent of the total cost. This is not clearly reflected in the figures quoted below, as in this case the contract system is largely employed. The costs of stores, mining material, etc., together with many other incidental charges associated with mining in this country, as well as administrative expenses, are very high. It is therefore essential that large footages be obtained, so that a reasonable distribution may be made of the 'constants.' An analysis of the costs of development upon a Rhodesian mine is given herewith:

Mine Development.

	Total cost.	Cost per ton milled, cents.	Percentage of total cost.
Salaries	$1,692.28	4.44	2.47
White wages	2,611.68	6.86	3.83
Contractors	21,882.74	57.50	32.03
Native wages	3,176.40	8.34	4.15
Native food	1,080.00	2.84	1.58
Stores	2,666.20	7.00	3.90
Maintenance	759.50	2.00	1.11
Workshops	1,046.86	2.74	1.53
Native hospital	287.14	0.74	0.42
Native labor supply	74.40	0.18	0.10
Pumping	4,439.52	11.66	6.50
Compound	864.08	2.26	1.27
Compressors and rock-drills.	16,399.74	43.08	24.00
Winding	1,605.16	4.22	2.35
Underground tramming	2,731.50	7.18	3.99
Assay account	690.94	1.80	1.01
Surveying and sampling	712.70	1.86	1.04
Rock-drills and sharpening.	5,579.28	14.66	8.17
Total	$68,300.12	179.36	99.45

The footage executed during the period covered by this expenditure amounted to 2,677, representing a cost of $26.50 per foot.

With hand labor, driving in fairly hard ground, 40 ft. per month is considered good work, while with machine-drills 80 ft. is an average. On the Rand, anything up to 200 ft. per month is made in driving; in shaft-sinking also this rate is attained. Upon one property with which the writer was connected in the Transvaal about six years ago, no less than 260 ft. of sinking was accomplished during one month, *i. e.*, from the 1,027-ft. level to the 1,287-ft. level.



A TEN-STAMP MILL IN RHODESIA.

The smaller amount of work accomplished in this country is due largely to the inferior equipment, both underground and on the surface, for handling large quantities of broken rock.

Working Expenses.—I believe that, in Rhodesia, the requirements of an engineer, in respect to the number of properties he is expected to manage, are unusual. It is therefore necessary that detailed and complete records be kept. The comparatively high and constantly fluctuating prices of mining materials and supplies make it essential that constant quotations of these articles be obtained and filed for daily reference, if any hope be entertained of effecting economy in operating expenses, as well as for the purpose of getting out estimates which can be treated with confidence.

This also suggests the importance of correctly measuring the tonnages handled. The methods in vogue are not conducive to accurate results; it is customary to count the cars of certain calculated capacity as they are delivered to the mill or crusher-station; this, less the number of cars discarded as waste (in all cases estimating 20 cu. ft. of broken rock = 1 ton), is taken as the tonnage crushed. It is apparent that greater care is required before a comprehensive comparison can be made of theoretical and actual results. The above methods would be all right if, after determining the number of cubic feet to the ton in individual cases, each car delivered to the mill was of exactly the same capacity and filled to the same point, and moisture samples taken. This, however, is not practicable. The stope measurements, in some cases, are used as a check, but it is hardly necessary to state that only an approximation is arrived at. This matter is of great importance, both as regards relative working costs as well as relative stamp-duty; therefore, it is imperative that a uniform system be adopted, at least in cases where the figures are to be filed for record and general information.

Scales should be used for automatically weighing and registering the cars delivered. Then, if each car is tared and periodic moisture samples are taken of the ore, as delivered, a correct idea of the tonnage will be obtained.

Milling.—The introduction of heavy stamps with the object of securing a large stamp-duty seems to have reached its practical limits, that is, at 1,456 lb. In Africa the mill is used more as a crushing machine than with the idea of effecting perfect amalgamation, and so long as the ores lend themselves readily to subsequent treatment by cyanide in the state of fineness produced by the use of a low discharge and a coarse screen (20 to 25-mesh), a high duty is well enough. The prevailing method of operating a stamp-mill, in so far as the mechanical end of the work is concerned, is as follows: Order of drop, 1-3-5-2-4; height of drop, 8 in.; number of drops per minute, ninety-six.

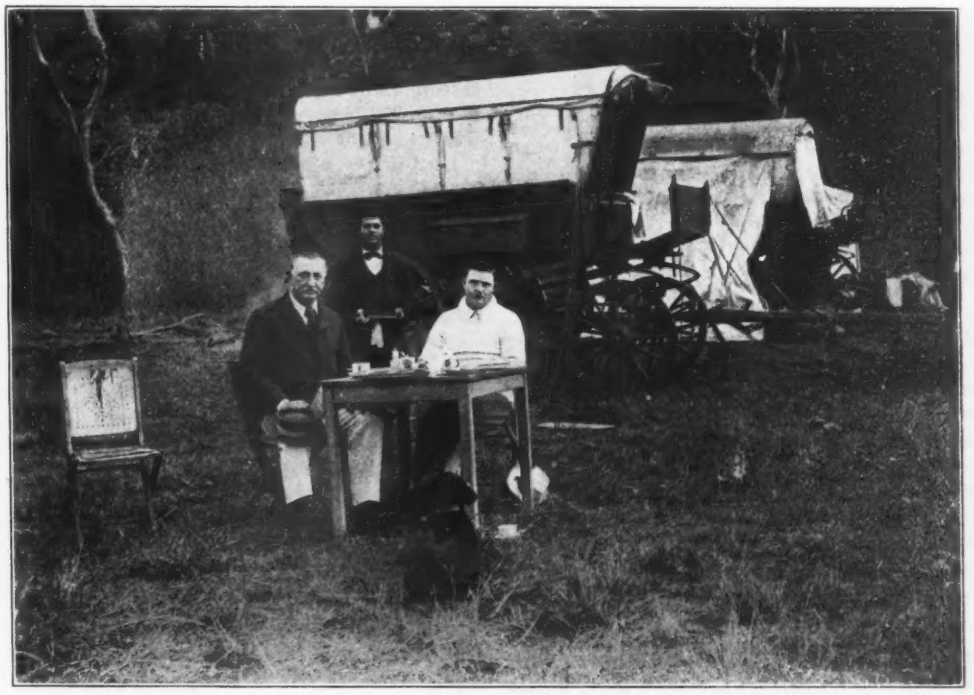
As a further means of increasing the stamp-duty, double crushing with rock-breakers is resorted to; the product being fed to the mill is crushed in the first case to about a 2.5-in. ring, and then passed to No. 2 crusher, where it is reduced to about a 1-in. ring. This method might be economically extended to three courses of crushing before being fed to the battery.

That most important branch of the work, namely, sorting, is almost entirely neglected in Rhodesian mines, and I daresay many tons of rock are sent through the mill which would not pay for the wear and tear that they are responsible for. Over a period of 12 months, with rock-breaking capacity sufficient to reduce the product to a 2-in. ring before entering the mill, an average duty of 5.5 tons per stamp per 24 hours has been obtained with 1,265-lb. stamps (an effective weight of 1,150 lb.), using a 2.5-in. discharge, 20-mesh screen, and the mill running at 96 eight-inch drops per minute.

It is well known that a stamp-mill under ordinary conditions does a large amount of unnecessary work, that is to say the product, when it has been reduced to the fineness indicated by the screen, is not immediately discharged; hence a large percentage of the ore is reduced to a much finer state of division than there is (from a crushing point of view) any necessity for. In recent years a great deal of attention has been given to this subject, with the result that there are now on the market several classes of subsidiary crushers for use in connection with the stamp-mill. As an illustration of the product furnished from a stamp-battery, it may be stated that the writer has found, when using a 10-mesh screen, that 87 per cent of the discharged product will pass through a 30-mesh screen, and a duty per stamp (of 1,150 lb.) of nearly 10 tons is obtained, with ordinarily hard quartz.

Cyanidation.—Generally speaking, the ores of Rhodesia present few difficulties in metallurgical treatment. In most cases, the veins produce a typical free-milling ore; at the mills with which the writer is connected the richest tailings contain 3 dwt. per ton, from an ore carrying 14 dwt. to 16 dwt. per ton. If the mill were operated with a view to high plate extraction, and the tonnage sacrificed, the grade of tailings would be even less. The sands, if fresh, lend themselves readily to cyanide treatment at a low cost per ton, while, if highly oxidized, as is often the case when working in close proximity to the ancient workings, a small additional cost is incurred in neutralizing.

The construction of the double treatment cyanide plant in use in this country presents no new features, and embraces the usual appliances necessary with zinc precipitation. The time of treatment varies with different ores, according to the character of the gold. In one instance the gold appears to be coated with a very thin film of iron sulphide and will not readily amalgamate; numerous coarse particles are contained in the tailings, and as much as 10 to 12 days are required to obtain a good extraction, although the usual treatment covers three to four days only.



CECIL RHODES IN CAMP.

A great variation is shown in the fineness of the gold produced from cyanide slimes; this is largely due to the fluxes used, or the preliminary method of treatment; it is quite possible, and not expensive, to produce gold as fine as 900 by using the following flux: Gold slimes, 100 parts; fused borax, 20 to 35; manganese dioxide, 20 to 40; sand, 15 to 40 parts. This is a modification of what we called Crosse's flux at Johannesburg. The exact proportion of borax, manganese dioxide and sand is best determined by practical tests; sometimes about 5 parts of fluorspar is used.

The addition of a cyanide plant, in a country of

free-milling ores, may be questioned, but it is contended that if the grade of tailings in the first case will pay for treatment, it is a distinct advantage to cyanide because of the increased capacity of the mill.

Gold Returns.—At the present time all declarations of gold output from the several producing mines are made in bullion.

The Mining Ordinance in Rhodesia demands that affidavits shall be made to the government, covering the actual amount of gold recovered monthly, by the individual companies, as well as by private enterprise. Hence, after each clean-up a declaration of this nature is made. The same form is requested by the local Chamber of Mines, the latter organization publishing the returns. Unfortunately the unit used is the bullion ounce, which may vary from 700 to 950 fine. It is obvious, therefore, that to make any comparisons without being in possession of the figures giving the exact fineness of the gold is a waste of time. In cyanide gold the discrepancies are even greater, the fineness varying from 250 to 750. The elasticity attending this method of dealing with gold is very great, and could be utilized for purposes of much graver importance than appears on the face of it. It would be far better to obliterate the troy measure altogether, substituting shillings and decimals of shillings, rather than continue the use of a method so devoid of meaning.

The monthly production of gold (or bullion) from Rhodesia has reached 23,570 oz. There are two or three large mills under construction, which will add to the production of next year. With this increase and the introduction of a constant supply of Asiatic labor, the probabilities are that an output of 40,000 oz. will be reached within a year or so.

GRAPHITE IMPORTS.—Imports of graphite into the United States for the 10 months ending October 31 were 13,907 tons, against 14,800 tons last year, a decrease of 893 tons.

SODA DEPOSITS IN EAST AFRICA.—The London *Mining World* states that a large soda lake has been found in the East Africa protectorate by an English exploring party. The sodium carbonate deposited on the shores of the lake is said to be very pure, containing less than 1 per cent salt. The locality is 88 miles distant from Kiu, on the Uganda Railway.

SOLUBILITY OF LIME IN CAUSTIC ALKALI.—A. d'Anselme reports (*Bulletin* Society Chemistry, 1903, XXIX, 936; *Journal* Society of Chemical Industry, XXII, 1,193) that the solubility of calcium hydroxide in water and in aqueous solutions of sodium hydrate decreases with increase of temperature, the solubility of water at 20° C. being double what it is at 100° C. At a given temperature, the solubility diminishes with increase of sodium hydrate, becoming practically nothing in a solution of 20 grams to the liter at all temperatures.

THE GLOVER TOWER.—John Glover, who died in 1902, built the first of the type of tower which bears his name at Washington, England, in 1859. This invention was the natural corollary of the Gay-Lussac tower, invented in 1827, but not put into practice until 15 years later, and, in conjunction with the latter, was the most important improvement that has ever been made in the chamber process of sulphuric acid manufacture. Glover did not patent his invention, nor did he try to keep it secret. On the contrary, he freely furnished information in regard to it to all who asked. Before very long, in spite of some opposition and adverse criticism, the Glover tower met with very wide-spread acceptance, and about 1870 Glover and his sons were kept busy designing towers to suit various installations. The fees received for these plans were the only pecuniary benefit Glover ever got from his invention.

COBALT-NICKEL ARSENIDES AND SILVER IN ONTARIO.

By WILLET G. MILLER.*

During the last month, the discovery of deposits of cobalt-nickel-arsenic and silver ores in the northern part of the Province of Ontario has been made public. Little importance appears to have been attached to the deposits by those who first saw them, it being thought that they carried a small amount of copper, the niccolite being mistaken for this metal. The Director of the Bureau of Mines, however, when on a recent visit to the district, received specimens of the minerals, and recognized that they represented valuable ore. The writer was, accordingly, instructed to make as thorough an examination of the deposits and surrounding area as could be made at the season of the year, snow having already begun to fall in the district.

The deposits were discovered during the building of the Temiscaming & Northern Ontario, the government railway, which is now under construction from North Bay junction, on the Canadian Pacific, to the head of Lake Temiscaming. The road-bed of this new railway runs almost over the top of the first of the deposits discovered. The deposits lie five miles south of the village of Haileybury, one of the two sister villages on the Ontario side of the northern part of Lake Temiscaming. Haileybury, following the railway, lies about 106 miles north of North Bay station, which is, by the Grand Trunk Railway, 227 miles north of the city of Toronto.

As the deposits were discovered quite recently, and snow has fallen in that district, very little prospecting has been done in the surrounding area. The discoveries were made by men employed on the railway, and not by regular prospectors; hence the work has not been done as systematically as it might have been.

When I visited the locality, recently, four veins or deposits had been located in the vicinity of a small body of water known as Long lake, which is not shown on existing maps. It lies about one-half mile south of the southern boundary of lots 8 and 9 in the first concession of the township of Bucke. The reports of other finds were not verified.

Each of the four veins visited was found to carry cobalt. Nickel also appears to be present in all of them; but as the weathering of the cobalt compounds masks, at times, the nickel colors, this latter metal was not definitely recognized in two of the deposits, although it doubtless occurs wherever the cobalt is found. Three of the veins are rich in native silver. The veins occur in unsurveyed territory, and, as the locations are as yet unnamed, we shall speak of them as Nos. 1, 2, 3 and 4. The outcrop of No. 2 lies about one-half mile southwest of No. 1, and No. 3 the same distance southwest of No. 2. The outcrop of the fourth vein is about one-half mile southeastward of No. 3.

Very little work has been done on any of the veins, and as the surface is pretty well filled by moss and soil, it is impossible to state what is their horizontal extent.

All of the veins cut through one or both of the formations known in the district as Huronian slate and breccia-conglomerate. The latter rock is considered to be composed of volcanic ejectamenta—grains and fragments of rock of various kinds which have become consolidated. The slate conglomerate of older Canadian writers, Logan and Murray, is a variety. The slate along the railway cuts, in the vicinity of Long lake, contains occasional fragments of pink granite, which are, at times, a couple of inches or more in diameter. On the faces of some of the vertical cliffs, the well-banded slate at the bottom is found to pass gradually into massive breccia-conglomerate at the top, the fragments in the latter being of varied composition, and ranging in size from small grain-like fragments to pieces of rock a foot in diameter.

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* Provincial Geologist of Ontario.

I have had no opportunity of making a laboratory study of the specimens of rocks collected. The presence of dikes or sheets of some of the darker-colored eruptives was suspected, but they were not definitely recognized. In the field they would resemble rather closely some of the more massive varieties of the slate and finer-grained breccia.

The slate and conglomerate have a slight dip, and the veins referred to cut them almost vertically. The strike of veins Nos. 1 and 3 is approximately northeast and southwest; that of 4 is east and west; that of 2, northwest and southeast. Diabase and gabbro invade these fragmental rocks in some parts of the district, and appear to underlie most of the area. About three miles to the northward of Long lake, Silurian limestone overlies the Huronian, but the limestone is undoubtedly of younger age than the veins.

Vein No. 1 lies east of the railway track, at the edge of a swamp, about one-quarter mile north of the end of Long lake. It has been uncovered at three points, which are within a few yards of one another. As the surface of the rock is low here, and little of it is exposed, it is difficult to tell much about the form of the deposit. Medium grained, dark-colored conglomerate is found on one wall. At the widest opening, the deposit has a width of over 6 ft., but the vein matter is more or less mixed with rock. The ore consists of niccolite, or the arsenide of nickel, and smaltite, the diarsenide of cobalt, together with much native silver. Niccolite contains, theoretically, 43.9 per cent of nickel and 56.1 of arsenic. Smaltite carries 28.2 per cent of cobalt and 71.8 of arsenic. It may be added that the ore of nickel now worked in Ontario, the iron sulphide or pyrrhotite of Sudbury, in which nickel occurs not as an essential but as an accidental constituent, carries, on the average, less than 5 per cent of the metal. On weathered surfaces the vein matter is coated with the beautiful pink decomposition product, cobalt bloom. The green nickel stain is also seen on some surfaces, but is usually masked by that of the cobalt. This nickel compound is probably the arsenate, annabergite, but nickel silicate may also be present. The secondary mineral, arsenolite, is present. The native silver occurs as films, or leaves and fine threads, or moss-like forms, through the nickel and cobalt minerals, especially in the niccolite, as well as in cracks in the rock and in the calcite veinstone. In weathered portions of the ore the silver shows distinctly. Some lumps of weathered ore, weighing from 10 to 50 lb., carry a high percentage of silver. One sheet, composed chiefly of silver, attached to a rock surface, had a thickness of nearly 0.375 in. and a diameter of about 1 ft. The silver appears to have crystallized earlier than the niccolite, which has been deposited around it. The cobalt arsenide has formed still later than the niccolite. As so little work has been done on this ore-body, it is difficult to determine whether the three openings belong to one vein, or whether the ore occurs in a more irregular deposit, although the chief opening appears to be on a vein-like body. The ore is undoubtedly very rich, containing values in nickel, cobalt, silver and arsenic, and a comparatively small vein could be worked at a handsome profit.

On location No. 2 the ore-body is distinctly vein-like in form. The ore here is a mixture of smaltite, and probably some closely related arsenides of cobalt, such as safflorite and niccolite. The only complete analysis which has yet been made of the ore from this locality was that of a sample from this vein. It was found to have the following percentage composition: Cobalt, 16.8; nickel, 7; iron, 6.3; arsenic, 69; rock matter, 0.9; total, 100. This ore-body, unlike the other three examined, carries no silver in the parts so far uncovered. Three openings have been made on the vein over a length of 300 ft. The massive ore has a width of 14 in., but vugs in the wall-rock, 2 ft. or more from the vein, are filled with cobalt bloom. The rock of both walls is slate. The walls are well defined, and the vein dips almost

vertically, the strike being toward the southeast. The vein lies on the hillside, a few hundred yards east of Long lake and the railway, and, unlike orebody No. 1, is at a height of about 70 ft. above the water level. Although the width of this vein is not great, the character of the ore is such as to make it promising, at the present prices of the metals contained in it.

The ore has a massive appearance, and a rather dark-gray color, where not coated with cobalt bloom. When examined carefully, however, in hand specimens, especially if a polished surface be examined with a magnifying glass, it is seen to be a mixture of a gray mineral, which is chiefly smaltite, and the reddish mineral, niccolite. Smaltite and the corresponding arsenide of nickel, chloanthite, are claimed by most authors to pass into one another by the substitution of cobalt for nickel, and *vice versa*. Niccolite, in the analysis quoted by Dana and others, carries only a small percentage of cobalt and iron, while smaltite and the other diarsenides of cobalt frequently contain much iron and nickel. In the ore under consideration, the cobalt and nickel appear to be, for the most part, in distinct compounds. In the analysis quoted, if we consider the 7 per cent of nickel to exist as niccolite, and the percentages of iron and cobalt, 6.3 and 16.8, respectively, to exist as smaltite, the theoretical percentage of arsenic in the ore should be 68.47, instead of 69, as found by analysis. The percentage of niccolite by weight would be 15.94, or about one-seventh part of the whole by volume, since niccolite has a somewhat higher specific gravity than smaltite. The specimens, when examined with the magnifying glass, agree with this. The niccolite has crystallized earlier than the smaltite, which forms the ground-mass through which the niccolite grains are set.

Minute, brilliant, silver-white or tin-white crystals occur sparingly, embedded in the wall-rock and in the ore. The crystals occur in cubes, and in combinations of this form with the pyritohedron, or rhombic dodecahedron, and octahedron. An analysis is required to determine whether they are smaltite, cobaltite, or some related compound. The smaltite shows a tendency to form globular or spheroidal masses, with a radiated structure. The ore is somewhat porous, spaces being left between the globules, which are tarnished almost black on their surfaces. Where not coated with cobalt bloom, the weathered surface of the ore has a dark color, not unlike that of the wall-rock. On a fresh surface, the more massive ore resembles mispickel, but is somewhat darker in color. Small grains of quartz are found sparingly in the ore. The proportion of nickel to cobalt in this case is less than that in No. 1. A more detailed study of the form and chemical composition of the minerals is being made.

Ore-body No. 3, so far as could be seen, is similar in character to No. 1. It lies at the southern edge of Long lake. The ore consists of native silver, smaltite and cobalt bloom, and, in all probability, niccolite also.

Vein No. 4, although having the smallest width of the four, is, in many respects, the most interesting of the group. Here a perpendicular bare cliff of rock, 60 or 70 ft. high, faces west. The vein, whose width averages not more than 8 in., cuts this face at right angles, and has an almost vertical dip. The vein is weathered away, leaving a crack in the face of the cliff 2 ft., in some places 4 or 5 ft., in depth. When I saw it first, it had not been disturbed. Thin leaves of silver up to 2 in. in diameter were lying on the ledges, and the decomposed vein matter was cemented together by the metal, like fungus in rotten wood. It was a vein such as one reads of in textbooks, but which is rarely seen, being so clearly defined and so rich in contents. It was found impossible to get a fresh sample of the ore with the prospecting-pick, the vein being so much decomposed. The weathered specimens, however, in addition to the native silver, contained cobalt bloom; and the unaltered ore will be found, in all probability, to consist of smaltite and niccolite, in addition to the silver. It may also be added that, in one part of the vein, a distinct banded structure was noticed. Across a distance of 8 in. there were 12 or 14 layers of ore lying parallel to the walls. At the bottom of the cliff the vein cuts thin, banded, dark-gray or greenish, at times almost black, slate, which has a slight dip. This slate passes gradually, so far as could be determined from the steep character of the cliff, into coarse breccia-conglomerate in the upper part. The fragments in the conglomerate consist of quartz-slate, granite and other rocks.

On some of the weathered surfaces of the native silver specimens there are small, black, spheroidal masses, with little luster. These appear to be the hydrated oxide of cobalt, heterogenite. Some of the deposits on the silver resemble asbolite. The carbonates of cobalt and nickel are also probably present. Antimony and sulphur have been detected in the ore of veins 1 and 2. Detailed analyses are required to determine the character of some of the silver-bearing minerals, which are present in small amounts. Bismuth, copper and manganese, in an association of ores such as we have in these deposits, are to be looked for.

These recently-discovered ore-bodies lie about 90 miles northeast of the town of Sudbury, in the vicinity of which are situated the well-known nickel mines. The ore of the latter is of a different character from that of the Haileybury deposits, being essentially pyrrhotite and copper pyrite. The rock associated with the Sudbury deposits, which are not veins, but deposits of irregular shape, is norite, a variety of gabbro; the ore itself is claimed by most writers to be of igneous origin. It is thus seen that there is little in common between the ore-bodies of the two localities, with the exception that nickel is a characteristic metal of each. The Sudbury pyrrhotites carry a small percentage of cobalt in addition to nickel. The minerals niccolite, danaite, and other arsenical compounds, have been found in some of the Sudbury deposits, but only in small quantities.

It is of interest to note that a deposit of sulpharsenide of iron, mispickel, was discovered a few years ago near Net lake, which lies about 25 miles to the southwestward of the Haileybury deposits. This mispickel, however, does not carry appreciable amounts of nickel, cobalt or silver.

On the Quebec side of Lake Temiscaming, about nine miles to the northeastward of the Haileybury deposits, a deposit, known as the Wright silver mine, was discovered many years ago by some of the early explorers of that region. During recent years, this deposit has been worked for its lead and silver contents. The deposit is unique in character, the wall-rock being Huronian breccia-conglomerate, the fragments in which are, at times, cemented together by argentiferous galena.

The only area in Ontario or central Canada which has hitherto been found to contain deposits of rich silver ore is that which lies near the head of Lake Superior. While native silver has been found in considerable quantity in these deposits, the sulphide, argentite, is the more characteristic ore. The Silver Islet mine, near Port Arthur, is well known to those interested in the metal industry. Deposits of somewhat similar character, which occur on the mainland, have also been frequently described. The report of Mr. E. D. Ingall, of the Canadian Geological Survey, published some years ago, gives a particularly full account of this silver-bearing area.

The silver veins in the vicinity of Port Arthur, like those of Haileybury, cut through slate, but the Port Arthur slates are held to be of later age—Animikie—than those of Haileybury, which are what is called, in a general way, Huronian. Much work remains to be done on our metamorphic and igneous rocks before the various formations can be correctly correlated. Both the Port Arthur and Haileybury slates have been disturbed by eruptions of diabase and related rocks.

Although cobalt and nickel minerals have not been found in quantity near Port Arthur, it is interesting to know that the ore of the Silver Islet and some of the other mines was, at times, found to be coated with cobalt bloom. Niccolite and other minerals carrying cobalt and nickel occur in small amounts in some of these deposits. The only deposit in which quicksilver has been found in Ontario is that of Silver Islet, where chloride of silver is also said to occur as a decomposition product.

Small quantities of cobalt, nickel and silver-bearing minerals occur on Michipicoton island, Lake Superior. Arsenical compounds of the first two metals have been found at several other localities in Ontario and at Calumet island, Quebec. It will be noticed that the association of minerals in these Haileybury veins is not unlike that found in some well-known deposits of Germany and other countries.

Although little prospecting has been done in the vicinity of the Haileybury deposits, it would appear, from the discoveries already made, that ore-bodies occur there which can be worked profitably for the metals which have been mentioned. It is scarcely probable that nickel will be found in sufficient quantity in these deposits to interfere materially with the lower grade, but large, deposits of the Sudbury area.

Slate and conglomerate, similar in character to those of Long lake, cover a very large, as yet little prospected, area in northern Ontario. These rocks, along the government railway, a considerable distance south of the deposits described in this paper, contain indications of the presence of cobalt ore.

It is stated in 'The Mineral Industry' that "cobalt, which is used in the arts, chiefly in the form of oxide, is obtained from New Caledonia, Australia and Germany, and smelted in France, Germany and Great Britain, the Messrs. Vivian, of Swansea, being the chief buyers in the last-named country." Cobalt oxide is produced at one plant in the United States.

The ore of New Caledonia, which is the world's largest producer, shipping about 3,000 tons yearly, is cobaltiferous wad, containing 25 to 30 per cent manganese and 2 to 8 per cent cobalt oxide (CoO). The ore of New South Wales is similar in character. In both countries the cobalt ore is a decomposition product, and occurs in irregular deposits, similar to those of bog iron ore.

At the end of 1901 and the beginning of 1902 the price of cobalt ore, containing 4 per cent cobalt, in New Caledonia, was forced up higher than circumstances warranted. For a long time the price in Europe did not justify more than 90 fr. per ton being paid for this quality of ore at the mines, but the price steadily rose to 330 fr. (about $66) until recently, since which it has receded. The black oxide of cobalt sells at from $2.26 to $2.30 per lb., or the metallic cobalt in the compound brings about $3 per lb. It would thus seem that the refiners should make a much larger profit than the miners. The market will not, however, stand a greatly increased production without the prices materially decreasing. It is claimed that there has been a combination among refiners to keep up the prices of the artificial cobalt products.

I would be pleased to receive inquiries from buyers of cobalt ore, and other minerals which are associated with it in the vicinity of Haileybury, with the object of putting them into communication with producers. Shipments could be made during the coming winter.

Since the above was written, Professor Nicol, of the Kingston School of Mining, has informed me that he has definitely recognized the antimonial silver, dyscrasite, as was suspected in the field, in association with the native silver of deposit No. 1. He has measured some of the minute bright metallic crystals spoken of, and finds them to be smaltite. He has also definitely determined the presence of chloanthite, $NiAs_2$. It is associated with the niccolite, and also occurs, pretty free from cobalt, in some of the nodular masses.

It is a rather striking coincidence that Mr. Colvocoresses' paper on 'Cobalt Mining in New Caledonia' should appear in the issue for November 28, of the ENGINEERING AND MINING JOURNAL, after

mine on the Ontario deposits had been sent to the editor. His paper gives later statistics than I had at hand. It shows that the output of New Caledonia for the year 1902 was 7,512 tons, or nearly double that of any preceding year, the statistics being given from 1889. The prices have kept up better than was expected they would two years ago, being, in September, 1903, 350 fr. for 5 per cent ore, with a rise of 12 fr. per ton for each 0.1 per cent above.

THE LEAD-ORE DEPOSITS OF WASHINGTON COUNTY, MISSOURI.

By An Occasional Correspondent.

Missouri, which is one of the greatest lead-producing States of the Union, has ore-deposits of various kinds, which, aside from theories of genesis, have, from the practical standpoint, only this in common: the ores are galena, occurring in limestones of the older formations. In the southwest, galena is found in the lower Carboniferous in connection with blende; in the southeast it occurs in the Silurian, partly in the form of fissure-veins, partly in the form of reticulated flat deposits, and partly in the form of the great disseminated deposits which characterize Madison and St. Francois counties. The last are not only the most important lead deposits in Missouri, but also are, with the exception of the Cœur d'Alene, the most important in the United States. All of the lead deposits of Missouri have been minutely studied by the State Geological Survey, and by independent geologists; but the very minuteness of their details, the obtrusion of geological theories, and, to a certain extent, the absence of a sense of proportion, have obscured, in some cases, the knowledge that is valuable to the engineer. Among these are the deposits of Washington and Franklin counties. These have in some cases been worked from the earliest days of lead mining in the United States, and their output has been large in the aggregate, although never very large in any one year. It has been, however, a question of interest to many mining men to determine if their output might not be increased by more systematic work.

The most important mining centers in Washington county are Potosi and Palmer. In both neighborhoods, galena is found in nests in the red clay overlying the country-rock, and in place in the country-rock, the latter being the more important source of the mineral. At Palmer, where the mines used to be operated by the Palmer Lead Company, now by its successor, the Renault Lead Company, the ore in place occurs in the form of a net-work of small channels, criss-crossing in all directions. Considered broadly, the entire system of channels constitutes an ore-shoot, or run of ore, lying nearly horizontally. The net-work exists not only on one level, but on two or three, and perhaps more, immediately underlying. These different horizons are connected by vertical crevices, sometimes mineralized. The formation may be imagined as a broad zone of fracturing in all directions, in which mineral deposition has occurred along the crevices or joint-planes in favorable strata of the rock.

The channels of ore are individually very small, but the ore is pure, except for barite, which is easily separated. The thickness of the ore may be from 1 in. to 18 in., occasionally more; a thickness of 12 in. is considered very fine indeed. The width of the ore may be from 2 ft. to 12 ft., but it does not average more than 4 ft., and anything more than 3 ft. is regarded as good mining ground. The local miners follow these channels with the smallest possible opening, the dimensions of a drift being rarely more than 4 by 4 ft., unless the width of the ore is in excess of 4 ft. Thus, in following a 4-ft. channel of ore of 6 in. average thickness, the miner will break 16 cu. ft. of ground and will get 2 cu. ft., or, approximately, 850 lb. of ore, assaying upward of 80 per cent Pb. The length of these channels is sometimes very considerable, amounting to several hundred feet. The richness of the ore, when found, is such that it will stand the breaking of considerable barren ground to get it, providing the frequency of the channels be sufficient. As to the latter factor, the experience at Palmer is indicative.

The most productive mines at Palmer have been the Flint Hill and the Parole. The former was discovered in August, 1899. In the first year of its exploitation it produced about 1,500 tons of ore. The area of mineralization, so far as yet determined, is about 300 ft. wide and 800 ft. long, but the major portion of the ore was got from a tract 200 by 400 ft., or, approximately, two acres. The ground was leased in lots of 75 by 75 ft. to 100 by 100 ft., according to depth (the shafts ranged from 40 to 90 ft. in depth). The maximum production of a 75 by 75-ft. lot was 130 tons. All told, probably about 50 shafts have been put down in the Flint Hill mine up to date. The maximum production in a single month was about 180 tons, which came through about 25 shafts, each operated by one man on the surface and two underground. The Parole mine was discovered in 1879, and was productive up to 1898, during which period it is estimated to have yielded, approximately, 9,000 tons of ore. The mineralized area was approximately 2,000 by 2,000 ft., or about 90 acres. The shallowest shaft was 22 ft. in depth; the deepest was 145 ft. The difference in depth is due to the rise of the hill and the slope of the strata from one end of the mine to the other. Ore was found in the Parole mine at several levels. The uppermost was mineralized chiefly with barite. The second, which was 5 ft. lower, was the most productive. The third, which was about 10 ft. below the second, showed good ore, but was not much worked, because the water encountered at that depth was more than could be handled by the mining methods in vogue. In the Flint Hill mine also three ore horizons were proved, the second being about 10 ft. below the first, and the third about 10 ft. below the second.

At Potosi, in Washington county, and at the Valle and Mammoth-Frumet mines, in Jefferson county, the occurrences of ore are quite similar to what it is at Palmer, but the Valle mines are unique for the quantity of zinc ore (smithsonite) they afford. The Bugg mine, at Potosi, is described by Winslow as showing a net-work of ore channels, following the stratification of the limestone, which cross and unite in all directions, the width of these channels being 3 to 10 ft. and their height generally only a few feet, but sometimes as much as 20 ft. Ore was worked in this mine at three horizons, and a noteworthy feature was a vertical crevice, from 0 to 10 ft. in width, which traversed the workings, and was traceable at the surface for over a quarter of a mile. In the Garatee mines of the Valle group there were ore horizons at 65, 95 and 135 ft., which were connected at some places by vertical chimneys. At the Valle mines proper there were three horizons, the first and second about 20 ft. apart, and the third about 8 ft. below the second. At the Perry mine there were four horizons, and at the Bisch mine there were two. The Valle mines, which are still operated, produce annually from 300 to 500 tons of lead ore and 1,500 to 2,000 tons of zinc ore.

Franklin county is characterized by the occurrence of galena in vertical crevices or veins, some of which are doubtless fissure-veins. A good many of these have been exploited on a small scale in the past, and one of them, namely, the Virginia mine, which was the most important in the county, was worked on rather a large scale. This mine was opened on a fault fissure, cutting vertically through magnesian limestone, varying in width from 1 to 15 ft., and filled with clay and barite in which galena was imbedded, while the galena sometimes formed a solid streak. At one place in the mine, at least, there was a good-sized body of nearly pure galena, averaging 5 ft. in width. The mine was opened by shafts from the surface for a distance of upward of 2,500 ft. along the outcrop of the vein, and two or three deep shafts were sunk, one of them to a depth of 480 ft. The mine was discovered in 1834, and is said to have produced upward of 13,000 tons of ore. Its operation was intermittent and was finally abandoned, because of mismanagement and legal vicissitudes; for many years now the mine has been idle. All of the old shafts are completely filled, the old workings are therefore inaccessible, and there is no reliable information as to what was their appearance when work was finally abandoned, but the remains of the old hoisting plant, concentrating mill and smelting furnace bear witness to the extent of former operations. There is at present only one of the fissure-vein mines of Franklin county in operation. This is the Belew, 4.5 miles south of Mosselle, which in 1902 produced 610 tons of ore.

At many places in Washington county nests of galena are found in the residual red clay overlying the region, and considerable lead is got from them, but not so much now as formerly. Similar deposits of barite are worked, however, for a large and increasing production, this region having become the most important source of barite in the United States. The supply of that mineral is limited only by the distance of economical carting, since there are large quantities in the remoter portions of the county which it has not yet been profitable to touch; the mines at Palmer, and elsewhere, show a good deal. This surface lead and barite undoubtedly come from the decay of rock which once contained such deposits in place as are found at Palmer, Potosi and elsewhere. An experiment to get galena and barite from the surface clay by hydraulicking is now being made near Potosi.

The lead production of these small mines is, in the aggregate, not inconsiderable. In 1901, according to the statistics of the State Inspector of Lead and Zinc Mines, the output of Jefferson county, chiefly the Valle mines, was 701 tons, of Franklin county, 1,007 tons, and of Washington county, 1,834 tons; a total of 3,542 tons. In 1902, the output of Jefferson county was 750 tons, of Franklin 1,309 tons, and of Washington 2,000 tons; a total of 4,059 tons. The output is entirely high-grade ore, most of it lump galena, hand sorted. There are a few large land-owners from whose property the major part of the ore is derived, especially the Renault Lead Company, of Palmer; the American Lead & Baryta Company, of Potosi; Old Mines and Shibboleth and the Valle Mining Company, of Valle Mines. These concerns have smelting furnaces. The remainder of the output is made largely by farmers, who sell their ore to the Bartle Lead Company, of Union, Mo., or to smelters at St. Louis. The practice of the large land-owners is to give parties of miners the right to dig on small lots of ground, usually 75 by 75 ft. or 100 by 100 ft., the miners having to turn over their product to the company at a fixed price per ton, generally $30, when lead is worth about 4c. at St. Louis. The party of miners usually comprises three men, one to work on top and two underground. They sink a shaft of as small dimension as feasible, say 3½ by 3½ ft., at an expense dependent upon the depth and the amount of excavation in rock. The cost is low, since miners can be hired in the district for $1 per day, and they will work cheaper for themselves. In cases where the company is prospecting on its own account, the cost of sinking in clay is 40 to 50c. per foot, by contract, including the cribbing. In rock, the cost is $3 to $5 per foot; in such rock that a progress of 4 ft. per week can be made, the cost is about $4 per foot. After the shaft has been sunk and ore has been discovered, the cost of mining per ton of ore depends chiefly upon the size of the ore channel and the distance to which it is followed. In a general way, the cost of mining is $6 to $12 per ton. In a channel 2 ft. thick and 6 ft. wide, a crew of three men produced 18 tons of ore in five days. A lot 150 by 150 ft., on which a shaft 70 ft. deep was sunk, produced from ore channels, varying from 6 in. to 18 in. in thickness and 3 ft. to 6 ft. in width, 200 tons of ore, worth $6,000 at the pit's mouth, at a profit of $5,000, or for a mining cost of $5 per ton. A lot 75 by 75 ft. yielded 130 tons of ore at a mining cost of $6.15 per ton. These are probably about the best results on record.

The mining is done in a very primitive way. Hoisting from depths to nearly 100 ft. is done by hand; for greater depths, by horse-whims; but there are few shafts more than 100 ft. deep. When water is encountered, operations are checked. The ore is followed horizontally by making the smallest possible opening in which a man can work, irrespective of comfort or efficiency. The ore and waste are dragged out to the shaft in a box, sometimes mounted on wooden wheels running on wooden rails, for distances as great as 400 ft. through a drift, following the undulations of the stratum, in which the trammer must progress on his knees, and wherein he can in no place stand erect. A drift 4 ft. in height is considered very commodious.

The methods of smelting are equally primitive, air furnaces and Scotch hearths, the latter without any of the modern improvements, being commonly employed. The air furnace is a rude reverberatory with a sloping hearth 9 by 3 ft., and a lateral fire-place at the lower end of the hearth. The lead, reduced by roast-reaction, runs down into a kettle outside of the furnace at the lower end of the hearth. Such a furnace, which is constructed at insignificant cost, is capable of smelting a charge of 2,000 lb. of ore in eight to ten hours, with the labor of one smelter and one helper, and the consumption of one cord of wood. At Palmer, comparative trials between these air furnaces and Scotch hearths resulted in favor of the former. The men are paid according to the yield of lead they get from the ore, which will range from 1,300 to 1,400 lb. per ton, averaging about 1,360 lb. The cost of smelting per ton of ore for a yield of 1,360 lb. will be $2.60 for labor, and $1 for wood; total, $3.60. The cost of 1,360 lb. pig lead, delivered at St. Louis, will be, therefore, approximately as follows: Ore cost, $30; carting, 80c.; smelting, $3.60; carting and railway freight, $3.40; selling commission, 50c.; total, $38.30, or about 2.80c. per lb., or, say, 3 to 3.25c., allowing for general expense. The profit per ton of ore is $10.20 to $13.60, when pig lead is worth 4c. at St. Louis. The raw ore probably assays 82 to 84 per cent Pb. A yield of 1,360 lb. of pig lead from 83 per cent ore indicates a recovery of about 82 per cent of the metal in the ore. A ton of ore makes also about 250 lb. of gray slag, which is high in lead, but is practically valueless, unless the smelter be near a railway. Assuming the gray slag to assay 40 per cent Pb., the total metal accounted for is nearly 88 per cent of the tenor of the ore, leaving 12 per cent as loss by dusting and volatilization, but probably the loss by volatilization is somewhat greater than that; the ore is never assayed, and the exact recovery is, therefore, unknown. However, the practical result is certainly a very satisfactory one, considering the trifling outlay required for plant and the low cost of smelting.

EXPORTS OF RUSSIAN IRON ORE.—According to a Russian authority, the exports of iron ore from central Russia will amount to about 300,000 tons for the current year, and there are prospects of a considerable increase in the future. A mining firm at Krivoi-Rog has recently contracted to furnish 500,000 tons of ore to furnaces in upper Silesia, the delivery extending over five years.

CHEMICAL WORKS' DIVIDENDS IN RUSSIA.—A careful compilation shows that in 1902 the smallest profits were reported by the manufacturers of artificial manures, only three of the six having paid dividends of 3 per cent. Three fairly large chemical works paid from 3 to 13 per cent. Among the best paying were the manufacturers of pharmaceutical products who divided from 8 to 15 per cent. Good profits were also shown by the foreign color works having branches in Russia, the Berlin Aniline und Soda Fabrik reporting a net profit of 136,000 roubles, and the Baden Aniline und Soda Fabrik, 130,000 roubles, with small expenditures.

ECONOMY IN MILL WATER.

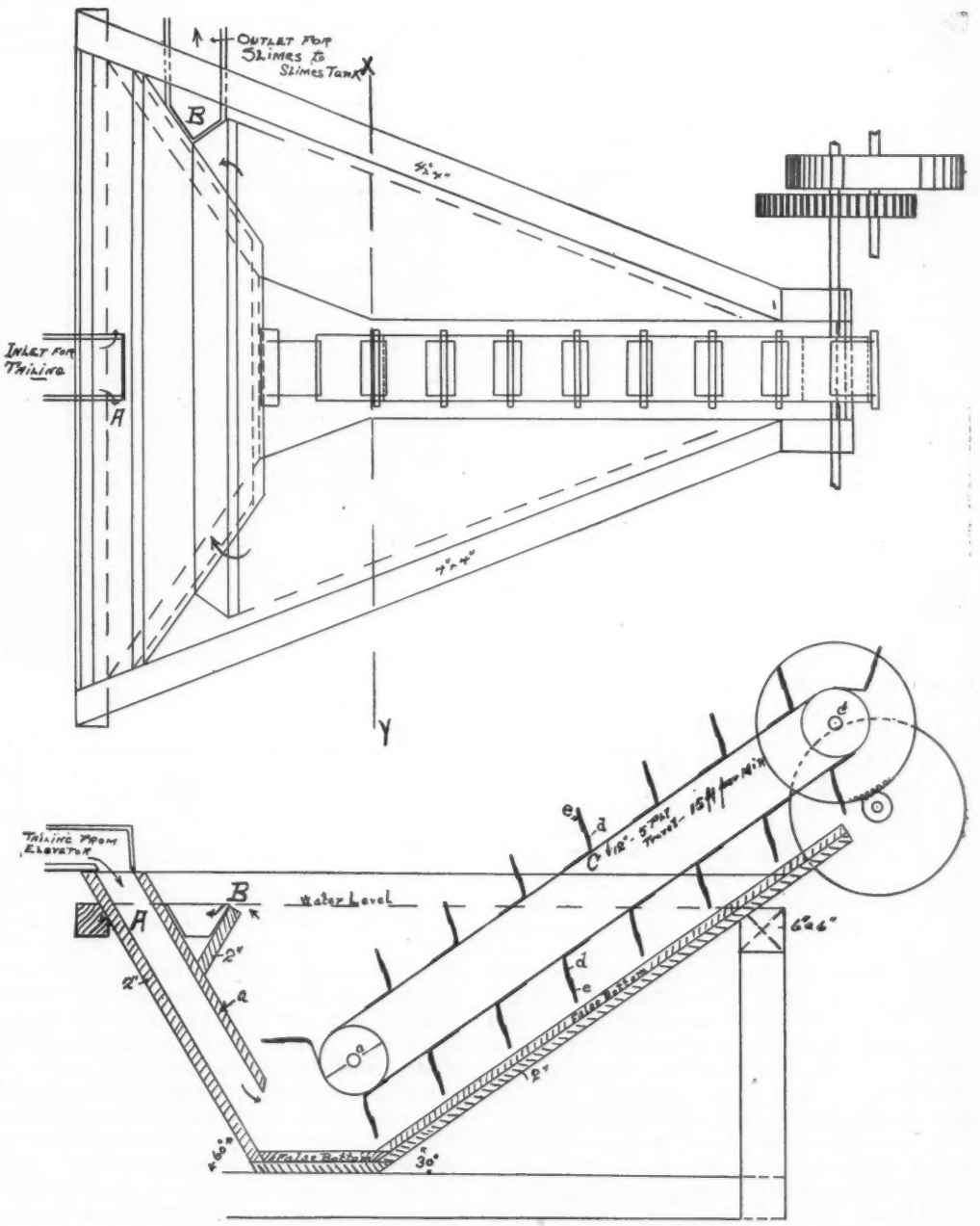
By JESSE SCOBEY.

With no running or surface water in sight or available, nine Wilfley tables were operated, during the year 1902, at Washington, Arizona, in a plant treating 100 tons per day, and requiring a 150-h. p. steam equipment.

A water supply was accumulated in a large storage tank before starting the plant, and this water, when the plant was running, was in constant circulation, being alternately fouled and cleaned, of both slimes and acid. To prevent any consumption in excess of the normal allowance was vital, as it would eventually close the mill. The reserve supply generally sustained the minor internal losses, and only on a few occasions was it necessary to shut down from an actual lack of water.

The final improvements, adopted from experience, gave a saving of 97 per cent of the water in circulation, and, in view of the 20 per cent loss admitted to be made in the South African cyanide plants, this loss of only 3 per cent may well be reviewed. The comparison in no way criticises the South African plants, as the widely different treatments account in a large way for the discrepancy. Mr. Denny said recently, in this JOURNAL, that the discharged tailings retain only 10 per cent water, and in this he means the sands only, else, of course, he would not have the 20 per cent loss; this construction puts the entire penalty upon the separation of the slimes, as in my saving of 97 per cent the sands carried 25 per cent water. The stamp-mill practice produced more slimes than did our roller mill, both from the manner of crushing and the method of screening, using in the stamps 30-mesh, and on the trommels for the rolls a 12-mesh cloth.

That the 20 per cent loss is excessive is admitted, when it is proposed to reduce this to 10 per cent by a better system for saving the slimed water, in the use of 20-ft. circular vats, which step is, to my mind, a proper one. So far, the system proposed is weak in the vital point of discharge, which must be over the entire periphery and must not be drawn from one point.



SAND-BOX IN WATER SAVING PLANT, WASHINGTON MINE.

The entire water supply at Washington was obtained by sinking a well, from which was run a drift across and under an *arroyo*, draining an extensive water-shed. Tests showed that this well would supply 7,500 gal. per day in the dry season; of course, more in the wet season, but that did not affect the problem. This amount was considered ample when properly used, and a small boiler and pump were installed with a 2-in. pipe line, to deliver this water to the plant, 1½ miles distant.

At the time I took charge of the plant, all machines were in place, and the design of the building

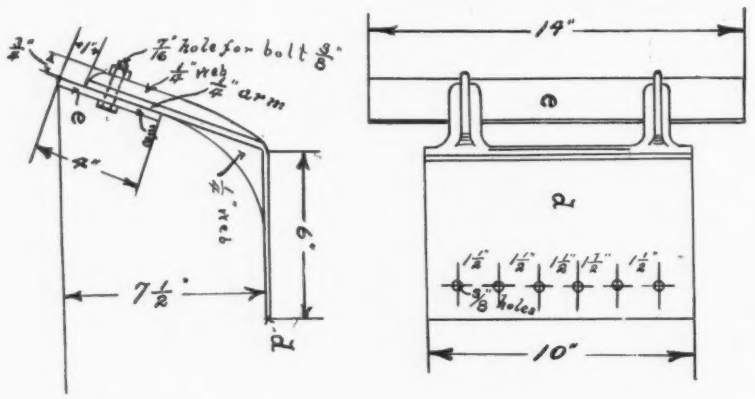
was such that they must be connected up as they stood. In brief outline, the ore carried copper, lead and zinc in a silicious gangue, heavy with garnet. It was crushed in rolls to 12-mesh and roasted; after cooling, it was treated magnetically, and about 20 per cent of the ore was lifted as a copper concentrate, which was reduced in a reverberatory furnace to copper matte. The remaining lead, zinc and garnet tails were submerged, and treated on tables to a lead-zinc concentrate, a zinc-garnet middling and tailings. Each of the two metallic products was redressed on two tables to shipping lead, and to zinc suitable for drying and subsequent magnetic cleaning. The nine tables for this work required, in feed and wash water, 900 tons of water per day, or 216,000 gallons.

The table floor was well laid in hydraulic cement, draining to the center, through which ran an open cement launder, that carried the tailings from the first five tables, and the waste water from the four dressing tables. About 5 per cent of the ore was taken out as a lead concentrate, which was collected in special boxes, from which the overflow water was discharged, after passing under and over baffle-boards, on the cement floor, from which it drained into the main artery. The concentrates were shoveled from the boxes into hemp sacks, and when first sacked would contain 25 per cent moisture; these drained to 15 per cent moisture in standing, before being finally removed to the shipping platform. The 15 per cent moisture in 5 tons of lead concentrates made a loss of 0.75 ton or 180 gal. per 24-hour day.

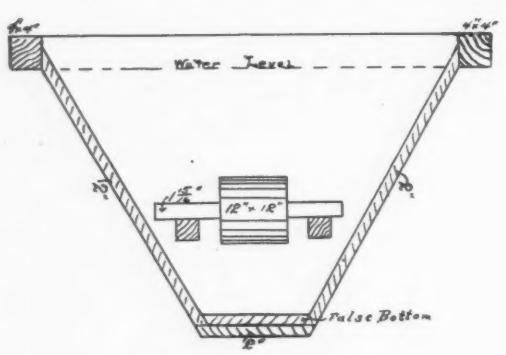
The zinc dressing tables gave about 15 per cent of the ore as material to be dried for final magnetic work. This was collected from the tables to an automatic drag, similar to the one about to be described, in which the sands were separated, giving waste water to the tailings launder, and the zinc, with 25 per cent water, to the drier, where the water was lost in evaporation. The 25 per cent moisture in 15 tons of zinc concentrates made a loss of water of 3.75 tons, or 900 gal., per day. This, with the loss in the lead, left 214,900 gal. discharging through the main launder, with recovery of which we were mainly concerned.

The extraction of copper, lead and zinc left about 60 per cent of the crude ore to be carried in suspension, by this water, to a cement pit, from which it was raised 20 ft., a head sufficient to allow the sands to be drawn off and the cleared water to be returned by gravity to the head-tank which supplied the tables.

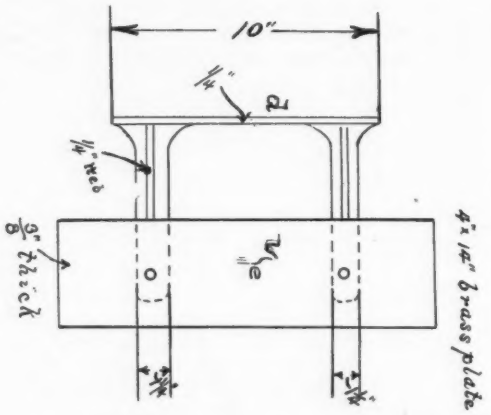
The sketch shows the means of accomplishing the separation of the sands from the slime water. The sand-box is in the form of a truncated pyramid inverted, with the larger triangle at the top, having a 7-ft. base and 10-ft. altitude. A 5-ft. depth of water filled the box to within 4 in. of the top. All sides of the box slope at an angle of 60° toward the bottom of the box, or toward the edge up which the sands are dragged at an angle of 30°. In this way all material settled in the box is deposited under the drag belt. When full, the settling area of the surface of the water is 35 sq. ft. The tailings from the elevator are discharged into the sand-box at *A*, where the false back *a* extends across the box and to within 18 in. of the bottom, allowing a 6-in. space for the full width of the back, which conducts the sand and water to the bottom of the pyramid, where it is practically entered at the apex, and under the bottom pulley, around which the drags are carried. The rising current is thus subjected to an enlarging area, increasing as the square of the distance ascended, which accordingly reduces the velocity in like proportion, and effectually drops the sand.



DETAILS OF SCRAPER.



SECTION OF SAND-BOX.



From the surface the overflow water and slimes are taken from the box by the 6-ft. weir *B* over the edge away from or opposite the sand discharge. This wide discharge materially reduces any tendency to form currents. The drag belt *C* is 12-in. five-ply rubber, traveling 15 ft. per minute over the foot pulley *c* and the head pulley *c*. The head shaft is in fixed bearings, to accommodate the gearing necessary to drive at the slow speed, while the foot-shaft is held loosely in its position by wooden bearings, as is the practice in the Joplin mills. These bearings are in the water at the bottom of the box and are in no way protected; they consist simply of a half-round cut in the end of a 4 by 4-in. hard-wood block. These pieces are held in place, each, by two bolts in slotted holes in the hickory, with just sufficient tension to keep the belt taut, and at the same time enabling it to be taken up by slightly tapping the block down with a sledge. Our experience with this kind of bearing in such a place, or in the foot of wet elevators, has been to prove its superiority over all iron and babbitt bearings, arranged either bridged or overhanging. It is much easier to admit that sand is going to get into your bearings, and to design the box accordingly, than to make fruitless efforts to keep it out. Under the above, apparently severe, test the wear on either the shaft or the bearing was not disastrous, after six months' continuous running. A hole closed with a plug in the bottom of the box, from which the contents can be drawn, is convenient in case of clogging or breakage.

The belt was equipped with brackets *d*, bolted 14 in., center to center, to which the drags proper *e* were bolted, with slotted holes in the plate, for taking up, reversal, or renewal, without changing the more costly bracket, upon which there is little wear. The drag was constructed especially to leave a space between the belt and the plate, so that when leaving the water the current could escape over, as well as around the sides, thus lessening any tendency to wash away the sand carried on the drag. From the time of leaving the lower pulley until discharging the gathered sand at the top, the edge of the plate rested on the floor of the edge of the pyramid, up which it traveled, protected by a 2 by 12-in. piece, that could be renewed. Acid water made it necessary that the bracket and drag, as well as all elevator cups and metal exposed to the water, should be made of copper; consequently we put the burden of the wear on the wood, which lasted about two months.

All the sands of the tailings were thus dragged over the point of the box, and some 2 ft. beyond the surface of the water, allowing the sands to drain, after which they were discharged, invariably containing 25 per cent moisture, to a small accumulating bin, to be taken to the dump in wheelbarrows. We failed in an effort to handle this mass by a belt conveyor, as it would cling to the belt, fouling the rollers and bearings, and quickly destroying the belt.

The water delivered from the sand-box carried about 10 per cent of the crude ore treated, in slimes, while the sand delivered was 50 per cent of the ore. The loss of 25 per cent moisture, in the sands going to the dump, amounted to 12.5 tons of water or 3,000 gal. per day. This loss now reduced the quantity going to the slimes tank to 211,900 gal., contaminated by 10 tons of fine slimes.

A photograph shows the tank in question, which was simply a 16 by 16 ft. standard round tank, to which has been added a false lining that gives the interior the appearance of an inverted cone, with sides 60° from the horizontal, truncated at the bottom of the tank in a circle of 2 ft. diameter. This lining is essential, as otherwise the settled slimes would not feed regularly to the discharge. No especial care is needed in putting in this lining, as it is supposed to fill behind with water, and eventually with slimes.

Around the upper rim of the tank, about 10 in. down, is fitted a 10-in. circular launder, enclosing the whole circumference. This was most expeditiously made by forming the bottom of the launder from sections sawed from a 2-in. plank to fit the outside of the tank. After securing these in place temporarily, the outside of the launder was formed by tacking to the 2-in. bottom the lower edge of a 10-in. six-ply rubber belt, which was easily formed around the tank in one piece. This was quite stiff enough to maintain itself erect, especially when the whole was incased by an ordinary hoop-band with drawnuts, which was so placed as to draw the belt against the 2-in. bottom, and the whole securely against the tank.

It is essential to have the overflow water drawn evenly over the top of the tank from all parts of the circumference, and, as the tops of the staves are irregular and hard to dress to a plane, this is facilitated by nailing around the top a 0.5-in. batten on edge, so that about one-half of its width stands above the ends of the staves; this thin strip is easily

bent around the tank, and its upper edge can be then planed down to an exact level, when the tank is filled with water; also, any uneven settling can be readily remedied.

In the center of the bottom of the tank is cut a 6-in. hole, to which, on the under side, is bolted a 6-in. tee, to one leg of which is attached a gate-valve that can be opened in emergencies, and to the other, by reducers, a 2-in. hose, which is carried out past the chime and raised some 8 ft., where the end is closed with a wooden plug in the center of which is a 0.5-in. nipple.

Supported vertically in the center of the tank is a long tube or box open at both ends, 12 by 12 in. in section, extending from above the water level down to within 2 ft. of the bottom, and directly over the 6-in. slimes outlet. Into the upper end of this tube the slime and water from the sand tank is introduced; it is delivered at the bottom at the apex of the cone, whence it rises evenly without irregular currents. With the velocity decreasing as the square of the ascension, the slimes are gradually dropped and are drawn continuously from the 0.5-in. nipple.

The velocity of discharge, and consequently the quantity of pulp drawn from the bottom of the tank, can be accurately gauged to suit the needs by raising or lowering the discharge end of the hose, and thus decreasing, or increasing, the head under which it works. This is an important detail, as no valve or jig-gate can be set to a small discharge of slimes, without sooner or later causing a disastrous stoppage that blocks the whole system. In our instance we found an 8-ft. head gave us a desired regular discharge of thick slimes, of about the consistency of molasses.

Under this head, and with a 0.5-in. orifice, clear water would have been discharged at a rate of 12,367 gal. per 24 hours, using the coefficient of discharge of 0.61. In our case the friction of the thickened slimes, through the 2-in. hose and small orifice, reduced the discharge to 6,500 gal. per day of slimes, with two parts of water to 1 of solid matter.

These slimes are dryer than those recorded by Mr. Denny in his practice, as 4 to 1 from the first operation, and I think this is mainly due to the use of the hose discharge. We anticipated discharging our slimes with the proportion of 2 to 1, but as there were more slimes than anticipated, it led to the discovery that when reduced to this thickness they settled, and gave a covering of clear water in time, incomparable to their former obstinacy. Accordingly we were led to re-treat them, which should have been done by the same system, but being driven to act quickly, we made a 6 by 8 by 6-ft. V-box, which taking so small a stream of pulp, discharged clear water, and settled slimes in the bottom as a thick mud, from where it was drawn intermittently by an attendant who took this as one of his miscellaneous duties.

Ten tons of slime tailings were thus discharged here, that would average about one part water to one of solid matter, which caused a loss of 10 tons of water, or 2,400 gal. per day. In summation there are:

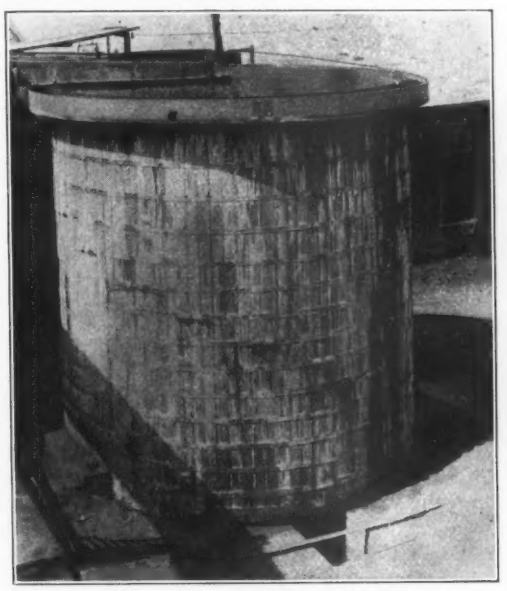
	Gallons
5 tons of lead concentrates	180
15 tons of zinc concentrates	900
50 tons of coarse tailings	3,000
10 tons of slime tailings	2,400
Total	6,480

In such a climate the evaporation may be considered, but it is not as much as is generally supposed, and, in our case, we estimated as nearly as possible that we were losing 6,500 gal. per day, distributed as above. With 216,000 gal. in circulation, this loss of 6,500 gal. represents a loss of only 3 per cent.

Various attempts have been made to claim a saving equal to this, by the use of huge and cumbersome V-boxes, as, notably, at Cananea, but, from casual observation, it could hardly be credited.

I have noticed that, where apparently muddy water was flowing over a wide weir, there was generally a thin film of clear water on the surface. Whether this is due to any property of the surface of water peculiar to the surface only, as in the capillary attraction shown on the sides of a vessel of water, or on the bead over the gauger's hook, I do not know, but to draw clear water from a light slime it is necessary to reduce the velocity of discharge by extending the cross section of discharge to its limit of breadth, so that the depth of the cross section of discharge reduces the water to a practical film; which brings us to the same thing.

In the case of our 16-ft. tank, the loss of 6,500 gal. left 209,500 gal. in circulation, which was cleared in 24 hours. As our discharge was over the entire circumference of the upper rim of the tank, this was equivalent to discharging over a 50-ft. weir. Such a quantity of water discharging, in this time, over a 50-ft. weir would flow with a depth or head of only 0.1875 in. This was the depth of our film, as near as it was practical to measure. Similar hydraulic formulas will show that from a head of 0.1875 in. under



TANK AT WASHINGTON MILLS, ARIZONA.

the above conditions, we will have a velocity of approach of 0.42 ft. per second, or 1,500 ft. per hour.

These figures I consider important, for a justifiable anticipation of good work. I know that the tank would do nothing like the same work, if the discharge were drawn from a 12-in. opening at any one point of the rim. If this should be done, we would have a 12-in. weir, which, to discharge the above amount of water in the same time, would require a depth or head of 2.4 in., which would draw from below what I would call the safe film, and would also create a velocity of 1.6 ft. per second, or 5,760 ft. per hour.

In this latter case, the depth over the weir would be 13 times as great, and the velocity of approach would be four times as great, which would again seem to accentuate the fact that the depth of discharge from the tank is of more importance than the velocity.

PROSPECTING FOR OIL IN RUSSIA.—According to the *Petroleum Review,* the Russian Government has commissioned a number of specialists to explore the oil-lands of Pashali-Akhtarma, in the Baku province. A private concern has already applied for, and received, a grant for prospecting in this field.

QUARTZ GLASS.—H. Heraeus states (*Zeitschrift für Elektrochemie,* IX, 847) that rock crystal (pure quartz) is converted into a fusible glass at about 1,700° C. When the glass is heated to about 2,300° C. there is a loss of silica by volatilization. Vessels of quartz may be safely heated to 1,350° C. without danger of deformation.

REGENERATIVE COPPER-SMELTING FURNACES

Prof. H. O. Hofman, in 'Notes on the Metallurgy of Copper in Montana,' read at the Albany meeting of the American Institute of Mining Engineers, 1903, describes the regenerative, reverberatory furnaces used at Great Falls. These are quite similar in construction to open-hearth steel furnaces. The gas is supplied by Evans-Klepetko producers, which are modifications of the Taylor, the chief point of difference being in the feed. The top revolves and carries four water-cooled arms, which level off the bed of coal in the producer. The latter gasifies 10 to 12.5 tons of coal per 24 hours, the coal being from 18 to 5 mm. size. (This is rather unusual practice in gas firing, mine-run coal being commonly employed.) Six producers serve one smelting furnace. The main gas canal has to be fired every eight days to burn out soot and tar, and has to be washed out once in six weeks to remove ashes. The gas leaves the producers at 700° C.

The furnace has a hearth 42 ft. 6 in. by 15 ft. 9 in., the same width at the ends as at the middle, which form has the disadvantage that the sides tend to bulge inwardly instead of outwardly, as is ordinarily the case. The furnace is built in five sections, in order to allow for expansion, which amounts to 14 in. longitudinally. (This is an important consideration in the construction of long, high-temperature furnaces.) The side walls are 18 in. thick; the roof 9 to 12 in. thick. The upper tie-rods are placed 12 in. above the roof, which may rise as much as 9 in. The lower tie-rods pass through the furnace 4 ft. below the brick hearth, which supports the quartz bottom. Originally they were passed through 4-in. wrought-iron tubes. These burned out, and hollow, water-cooled tie-rods were tried. At present 1½-in. solid rods, passed through openings 2 ft. 6 in. by 3 ft. 8 in., are employed.

The regenerative chambers are filled with brick, forming a series of horizontal flues, 18 in. high, 7 in. wide and 11 to 21 ft. long, according to position. The top and bottom of the chambers are laid with 9-in. brick, set 4½ in. apart, which leaves spaces for dust to fall through into an inferior pit, 4 to 5 ft. deep. The regenerative chambers for air are 8 ft. 6 in. wide, 13 ft. 9 in. high, and 14 ft. 7½ in. long; for gas, the dimensions are the same, except the width, which is 7 ft. The heating surfaces are 4,900 and 4,200 sq. ft., respectively. The life of the checker work is about three months.

In putting a new furnace in operation, a light wood fire is started on the hearth in half a dozen places, and the valves are reversed every 30 minutes. In 10 days the furnace will be at dull red heat; in two days more, hot enough to ignite producer gas. The gas is turned on in small quantity at first. After three days the wood ashes are pulled out. On the 16th or 17th day after starting, the furnace will be a bright cherry red, when 5 tons of sand are spread over the hearth, covering it to a depth of 2 in. Charging of sand is continued at 5 or 6-hour intervals, until 60 tons have been put in, care being taken to have the sand thoroughly calcined. The furnace is then fired hard for 36 to 48 hours, to bring it to the highest heat it will stand without endangering the brick-work, and the sand is brought to a set, which amounts to about 3 in. in depth. The high heat is maintained 16 hours, after which the furnace is cooled down, in 8 hours, to cherry red, and sufficient calcined ore is put in to cover the hearth 3 in. deep; it is melted down and absorbed by the sand bottom. The furnace is then cooled as before, and a second charge of calcines is put in and melted. Of this, only a part will be absorbed by the bottom; the rest is tapped out. The furnace is again cooled, 12 to 15 tons of ore-charge are put in, melted down, tapped out, and the furnace is then cooled slowly to dark red. The furnace is again fired up, worked for three days as under normal conditions, then tapped dry and allowed to cool to cherry red, after which it is safe for any kind of work. The time required to bring a new furnace to this point is three weeks. The object of the repeated coolings

is to harden the bottom, which, if put down otherwise, is likely to be mushy when hot.

The regenerative furnace at Great Falls smelts 150 tons of charge per 24 hours, or 0.218 ton per square foot of hearth, against 0.1 to 0.13 in direct-fired furnaces. The ratio of concentration is 3.5:1. The consumption of coal is 50 per cent of the weight of the charge, the coal employed containing from 17 to 30 per cent in ash. The matte produced contains 50 per cent copper. The slag assays 41.9 per cent silica, 42.7 ferrous and manganous oxides, 10.9 alumina, 1.1 lime, and 0.58 per cent copper.

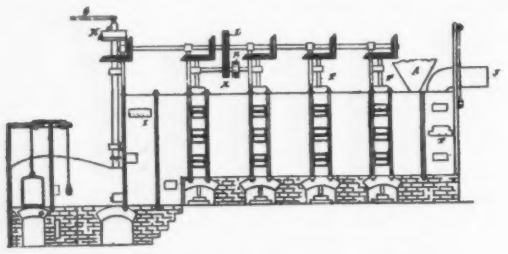
THE EDWARDS AND THE MERTON ROASTING FURNACES.*

BY W. EVAN SIMPSON.

The Edwards furnace was first introduced into the Kalgoorlie district by the Great Boulder Proprietary Company over four years ago, and, until recently, it has superseded all others.

It is a single-hearth reverberatory furnace, with mechanical rakes, enclosed in a casing of boiler-plate. The sides are made of two girders, each 60 ft. long, built on the cantilever principle, and the ends of plain ¼-in. plate, while stout corrugated iron sheets, bolted to the lower webs of the girders, act as the support for the 6-ft-wide bed or hearth.

The frame of the hearth, properly stayed and strengthened where necessary, is supported about 2 ft. clear of the ground upon a couple of pivots placed midway between the ends, and it is held rigidly at the desired inclination by a couple of screw jacks. The rabbling is done by a line of 15 revolving rakes,



MERTON ROASTING FURNACE.

with vertical stems or shafts passing through the furnace arch; the actual stirrers are five small, removable ploughs, attached to a cast-iron arm, which describes a horizontal circle in the ore. Each revolving rake or rabble moves in the opposite direction to its immediate neighbor, and the ore is thus made to travel in a zigzag course along the bed of the furnace.

All the mechanism is easily accessible; the rabble bearings, gear wheels, shafting, etc., being held in position in an iron framework on top of the furnace.

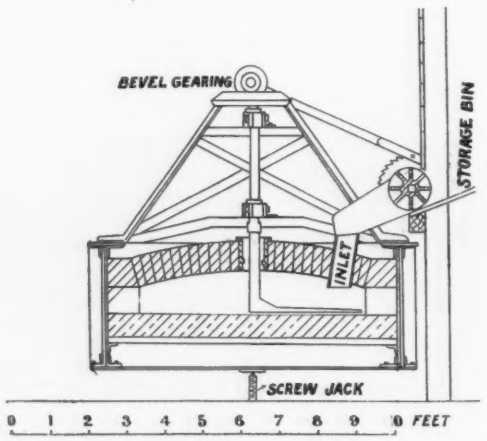
The five rabbles nearest to the fire-box are hollow, and are kept cool by a stream of water, which is constantly passing down through a central pipe in each, and after ascending, escapes into a channel ring encircling the rabble axle on top of the arch. The inclination of the furnaces at the Boulder Main Reef is about 9 in. in the total length, 60 ft. The layer of ore is usually 2 to 3 in. deep on the hearth, and two hours are occupied in its journey from the inlet to the discharge.

Each furnace is fed by what is known as a 'fluted roll,' a contrivance far superior to screws, either single or double, or to any other feeder yet introduced. It is a cast-iron cylinder, 3 ft. long and 10 in. in diameter, with eight V-shaped channels on its circumference. It is carried by a horizontal axle, to which is also keyed a ratchet-wheel with 40 teeth. The roll is let into the front of the bin on a level with the bottom, and is always partly embedded in the powdered ore, which fills the channels and is discharged into the furnace as the roll rotates.

The rate of feed depends on the rate at which the roll revolves, and this is regulated by the ratchet mechanism. The power is obtained through an adjustable eccentric keyed on to the shaft which drives the furnace rabbles.

The Merton furnace has recently been introduced by the Great Boulder Proprietary Company; in its main features it is somewhat similar to the Edwards. The chief differences are these: it occupies less area, has three superimposed hearths, all perfectly level and communicating with one another by vertical channels in the usual way, and it is built directly upon the ground instead of being placed in an iron framework, and consequently the angle of inclination of its hearths cannot be changed.

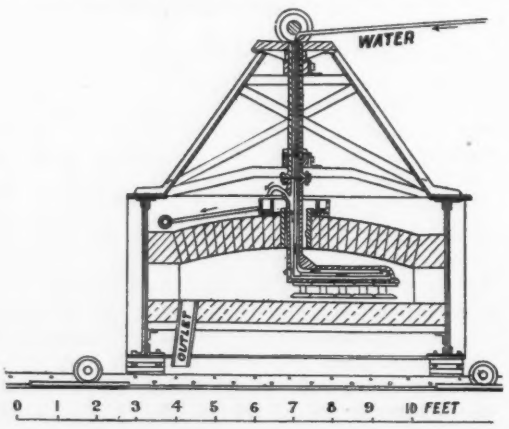
The rabbles, five in number, are in principle precisely similar to those of the Edwards furnace; but



EDWARDS FURNACE, RECEIVING END.

each rabble stem passes through all three hearths and is supported by a footstep underneath the lowest hearth, the arms or rakes being clamped on at heights to suit the different hearths. This arrangement, however, would appear to be somewhat disadvantageous in the case of a breakdown necessitating the withdrawal of the rabble shaft.

The Merton furnace is more economical in the



EDWARDS FURNACE, DISCHARGE END.

consumption of fuel, as the arch of the lower hearth heats and really is the bed of the one immediately over it. The roast, too, is better, as the ore falls in a shower through the flame in its passage from hearth to hearth. This is, however, accompanied by a somewhat greater loss in dust. Its initial cost is considerably less than that of the Edwards, and its capacity some 20 per cent greater, so that at present its future seems assured.

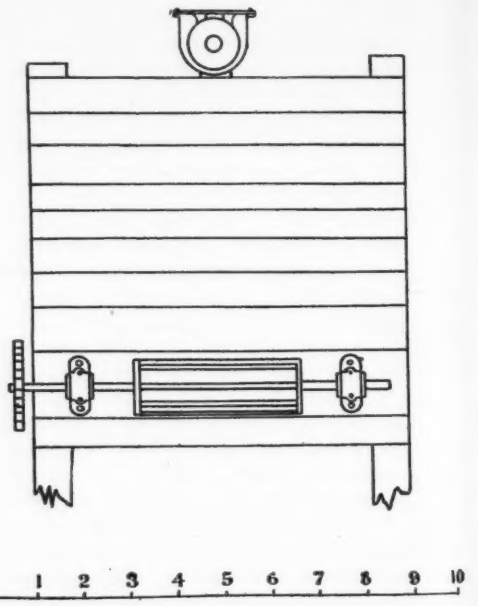
The Edwards furnace has the advantage over the Merton in that its capacity can be altered by varying the angle of inclination of its hearth to suit the composition of the material being treated. A heavy sulphide would require a very small inclination so as to make it travel slowly toward the flame, while a partially oxidized material could be treated more rapidly by having the furnace tilted at a greater angle. This is decidedly advantageous in a customs works treating many different parcels of concentrates, etc.; but on a mine where, as a rule, the ore does not suddenly alter in composition, the possibility of varying the inclination is of little or no use. As a matter of fact, the beds of the furnaces on the Boulder Main Reef have been kept with the same inclination—9 in. in 60 ft.—since first erected, and are now all bricked in.

With the Edwards furnace it seems possible to obtain still better results by allowing the hot waste furnace gases, after passing over the ore, to travel back in flues underneath the hearth in a tortuous fashion, and thence to the stack, in the same manner as the gases of a Lancashire boiler.

The ore, too, might be made to travel in a conveyor along the top of the furnace, as is now being done with the concentrates at the Lake View Consols gold mine, and so be fed into the furnace hot, and just on the point of oxidation.

A further improvement would be to make the rabbles hollow throughout, and open at both top and foot, so as to allow an air current to be drawn through them into the furnace. This would be better than the present plan of taking in the air through furnace doors open, because the air would be heated, and so rendered more energetic for roasting; besides, the air current would keep the rabble cool. From 2 to 3 h. p. are required for each furnace.

The fuel in use at Kalgoorlie is the local salmon gum, a species of eucalyptus. It is of excellent



STORAGE BIN, FRONT ELEVATION.

quality and can be delivered on the mines at about $3.24 per ton. The consumption amounts to about 2.6 tons per day (24 hours) for each Edwards, and 2.4, or slightly less, for each Merton furnace.

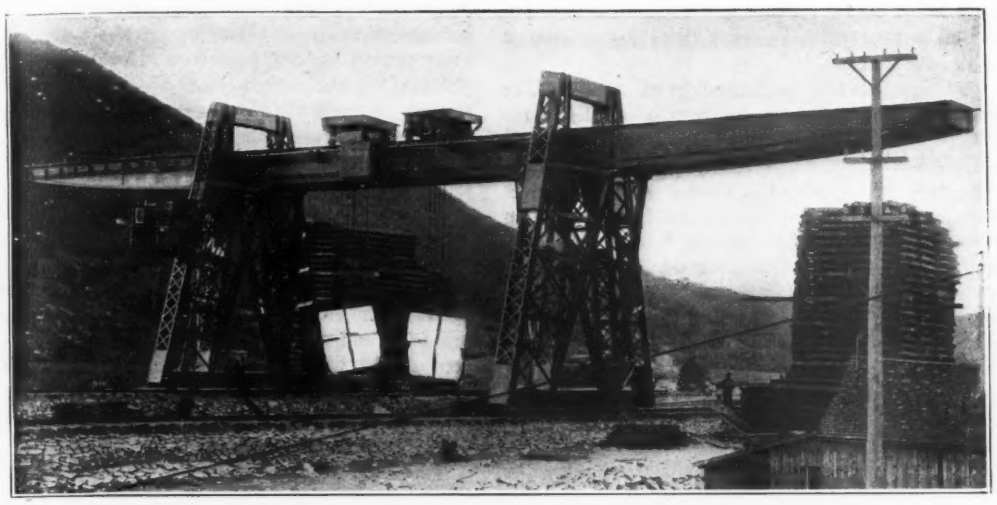
MINERAL DEPOSITS OF MISSISSIPPI.—Under an agreement recently made between the United States Geological Survey and Mr. R. H. Henry, Mississippi Commissioner for the Louisiana Purchase Exposition, investigations of the economic geology of that State are now being carried on by United States geologists. It is known that large clay deposits and extensive beds of portland cement materials occur in Mississippi, but until recently no attempt has been made to procure such detailed information regarding the quality and quantity of these materials as is necessary before the deposits can be developed. Attention will also be paid to the development of the minor mineral resources of Mississippi, among which may be included glass sand, molding sands, lignite, red and yellow ochers and fuller's earth, all of which are known to occur in commercial quantities. Metallic ores are not found in deposits of sufficient size or quality for mining anywhere in the State, and coal is also lacking, but the active development of the cement, clay and other resources named above would add greatly to the wealth of the community.

*Abstract from paper entitled 'Treatment of Telluride Ores by Dry-Crushing and Roasting at Kalgoorlie, Western Australia.' Institution of Mining and Metallurgy, October, 1903.

AN ELECTRIC GANTRY TRAVELING CRANE.

The photograph shows a five-motor, double-trolley electric gantry traveling crane, 50 tons capacity, recently installed in the yards of the Vermont Marble Company, at West Rutland, Vt. The crane is equipped with two trolleys, each 25 tons capacity.

The distance between truck-frames which support the bridge is 60 ft., and the overhang of each cantilever arm 50 ft., making the total length of bridge 160 ft. The bridge has a maximum capacity of 50 tons in the middle of the span, and the cantilever arms are designed to support 10-ton loads with the trolley at extreme outside position. The height of lift for each hoist is 30 ft.



GANTRY CRANE FOR VERMONT MARBLE COMPANY, WEST RUTLAND.

All movements are operated by independent electric motors, especially designed for crane service. The speeds for maximum loads are as follows: Hoist, 15 ft. per minute; trolley travel, 100 ft.; bridge travel, 150 ft. per minute.

The trolleys and bridge-motor end mechanism are covered and cage enclosed for outdoor service. The bridge consists of two box-girders, supported on truck-frames, placed 60 ft. apart. These girders are of heavy construction, to resist lateral force. Web stiffeners are liberally used, and also diaphragms connecting the two web plates in each girder. The truck-frames are built up of structural shapes, and are well braced in every direction.

This crane is carried on eight wheels, four under each end of the crane. The four wheels under each end comprise two sets, one set under each cast-steel truck, which truck is pivoted, allowing it to accommodate itself to any unevenness in track.

The current for this crane is supplied by trolley wires, at one end and above the crane, and it is carried to the crane by means of a harp and collector-wheel, after the method used in street-car service. The circuit on which this crane operates is 220 volts D. C.

Connections to bridge girders cover a distance of 17 ft. Both truck-frames are open to permit the load to pass through them. The truck-frames terminate at the bottom in built-up girders, each carrying two cast-steel pivoted trucks, which permit a vertical movement to provide for inequalities of the track. The wheels are fitted with double-flange rolled-steel tires.

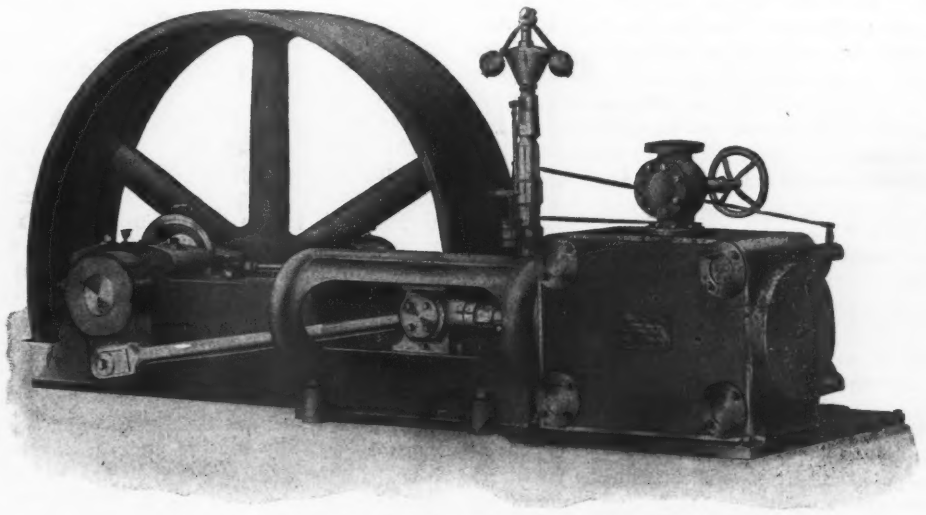
In erecting, the bridge girders were riveted up on the ground. Each girder was shipped in three pieces, the field-joints having all members staggered. The bridge girders were riveted together on the ground, and the trolleys placed in position; the entire bridge, with trolleys, was raised by means of 40-ton hydraulic jacks. The cribbing of railroad ties shown in the photograph was placed under the bridge as it was raised. When at a proper height, the truck-frames were raised in parts and connections made. All field-joints are riveted. By means of temporary wiring connections, the truck-frames were raised by the hoists on the trolleys themselves. In fact, these trolleys were in operation all the time the bridge was being raised, in hoisting up ties for the cribs. The weight of the completed structure is about 280,000 lb. in all.

A railroad track runs midway between the two tracks on which the gantry operates. Marble blocks will be taken from cars on this track and stored, and also will be delivered from the yard to cars. The space covered is 160 ft. wide and 600 ft. long. The gantry crane will take the place of seven derricks, with which the old yard is equipped. As each derrick required one man, seven in all, and the gantry has only one man for manipulation, the saving is apparent. Moreover, the gantry crane takes up less space, and can handle loads with much greater rapidity. The photograph shows a load of about 25 tons on each trolley.

This crane was manufactured by the Whiting Foundry Equipment Company, at Harvey, Ill., a suburb of Chicago.

A NEW STANDARD REYNOLDS-CORLISS ENGINE.

We illustrate herewith a new Corliss engine, which is being brought out by the Allis-Chalmers Company from the designs of Irving H. Reynolds. The field of Corliss engine design has been so fully worked over in the past, and the accepted designs have become so simple, that no strikingly novel designs are to be expected. The present machine, however, represents the experience of 26 years in building of Corliss engines, and combines all of the desirable elements of the best designs.



A NEW TYPE OF REYNOLDS-CORLISS ENGINE.

Engines of the type illustrated are being built in seven sizes, ranging from 50 to 500 h. p., and are designed for steam pressures up to 150 lb. They are built of somewhat shorter strokes than have heretofore been customary in Corliss engines, with the idea of economizing in space and making the construction more rigid. The speeds are also somewhat higher than usual, ranging from 110 to 150 revolutions per minute, although these speeds are not higher than those at which the Reynolds-Corliss engines of older design are frequently operated.

The frame is cast in one piece with the slide, the construction being of the box type, resting on the foundation for its entire length. The main bearing shells are bored into the frame, thus insuring a solid bearing, and also permitting the easy removal of the shells by rolling them out around the shaft.

The slide is of the barrel type, with bored guides. The cross-head is fitted with babbitt-faced shoes, with wedge adjustment. The piston-rod is screwed into the cross-head, and held firmly with a steel lock-nut. The cylinder is of the round-cornered type, is fitted with double-ported steam and exhaust valves, lagged with planished steel. The cylinder is set on a cast-iron base-plate, which extends under the valve gear, serving as a drip pan.

The valve gear is of the usual Reynolds-Corliss type, the wrist-plate being of skeleton pattern and fitted with a new type of disconnecting device which, while clamping the hook-rod firmly, is very easily detached by hand. The dash-pots are of differential plunger type, without leather or packing of any kind.

The regulator is of the high-speed, weighted type, designed to control the engine within narrow limits of speed variation.

The connecting-rod is of steel with solid forged ends, fitted with bronze boxes, babbitt-lined on the crank-pin ends, the boxes being adjustable by means of screw-actuated wedges. The crank is of plain type, polished on the face, and is protected by a planished steel oil guard. The engines are fitted either with belt fly-wheels, as shown, or with square-rim wheels, where used with direct-connected electric generators. The crank and cross-head pins and main journals are of a size ordinarily used with heavy duty engines.

In brief, the engine is strong, simple and compact, and while nothing has been added for ornamentation, nothing contributing to economy or durability has been omitted. The compact construction and strength of frames, etc., adapt it specially for mill work.

THE HEAVIEST RAILS.—The Pennsylvania Steel Company is working on an order of 3,400 tons of steel rails for the Pennsylvania Railroad, which will weigh 140 lb. to the yard. These rails will be used in tracks laid in the streets of Philadelphia. They are girder rails, made exceptionally heavy for carrying the heaviest freight cars and engines, and at the same time are in accordance with regular street car specifications. They are 9 in. in height.

GOLD IN OKLAHOMA.

The reported discoveries of gold in the Wichita mountains, Oklahoma, which have been circulated from time to time in the press, are being investigated by the United States Geological Survey. The activity of prospectors in this locality has given rise to frequent controversies with the settlers on whose lands mineral claims have been filed, and as a result Mr. H. Foster Bain was specially commissioned to examine and report upon the so-called gold occurrences. When this country was opened up in 1901, the miners were permitted to go in and prospect. For 50 years or more, rumors have been abroad of old Spanish mines rich in gold and silver that were once worked in the hills. A few years ago Mr. Joseph A. Taff, of the United States Geological Survey, visited the district officially and began the compilation of a geologic map. Mr. Taff's study had special reference to the geological formations of the district, but he gave considerable attention to the mineral deposits, which he reported to be valueless. Mr. Bain's investigations in this field have been confined exclusively to a study of the ore-deposits, and his report will be considered as supplementary to that of Mr. Taff.

At the time the territory was thrown open to miners, homesteaders were also allowed to take up lands. Confusion and strike soon resulted. The miners got onto school lands and Indian allotment lands, as well as homestead claims. The Indian police took occasion then to interfere, and their aggressive actions created considerable excitement.

The ultimate question involved is whether or not there is mineral wealth in the district sufficient to justify these contentions. Local opinion rejected Mr. Taff's verdict on the ground that his examination of the field was too cursory to be entirely satisfactory. Mr. Bain was accordingly sent to pursue the investigation to a definite conclusion. He spent some time in the district, examining particular mines in development and taking samples of everything that the miners said was ore. The samples were shipped to Washington, where they are now being assayed.

NEW COLLIERIES IN FRANCE.—It is stated that 27 new shafts are being sunk in France, at various points, in the coal measures.

ABSTRACTS OF OFFICIAL REPORTS.

Shannon Copper Company.

The report of this company covers the year ending August 31, 1903. The capital stock is $3,000,000, and there is a bonded debt of $540,000. The surplus amounted to $88,169. The mines are at Clifton, Ariz. The year, the report states, was one of many interruptions, from various causes. The last one was due to the miners' strike in June, so that the last consecutive run was only for two full months, July and August.

The income account for the year is as follows:

Gross profit, four months' running time	$158,971
Loss carried over from previous year	$20,819
Loss from fall in price of copper carried on inventory	8,333
Interest on bonds	41,650
Total	$70,802
Balance, surplus	$88,169

The report of President George C. Gill says: "During the year a contract was let for a 500-ton concentrator, designed in two sections, with the machinery for one section capable of handling 250 tons of ore daily. This plant has been running since March 7, its work being entirely satisfactory. Last September we placed the order for the machinery for the second 250-ton section, our ore reserves having increased to such an extent as to justify it. It is now being installed, and we expect to put it in commission in February next. In January we bought and installed a briquetting plant, which takes care of the flue-dust, etc. It works admirably, is economical, and is an excellent investment.

"Prospecting and development work has been vigorously pushed, opening up many new and valuable ore-bodies and demonstrating the value of others. We have driven during the last year 7,107 feet, or nearly 1.5 miles, of tunnels, shafts, winzes, etc., and now have about 5.5 miles of underground workings. A very careful estimate of the ore reserves has been made by the superintendent and his assistant, and the estimate shows enough ore in sight to run the smelting plant for over five years. In addition, three very promising ore-bodies have been discovered on our other claims since their report was made. We shall follow this development work up carefully, and expect to be able to report a large ore reserve in sight each year.

"On September 1, we retired 60 of our bonds, or $60,000, as called for by the deed of trust. These bonds were purchased at a price which was entirely satisfactory to your directors. This year we hope to be able to pay for all our contemplated improvements, retire $60,000 of bonds, and have something for the stockholders besides, but it must be borne in mind that the price of copper has a very material bearing on the profits that we may earn."

United States Coal & Oil Company.

This company has owned and operated, for several years, oil wells in West Virginia and southern Ohio. To this business a coal property was added last year. The report is for the year ending September 30, 1903. The company owns 16,910 acres of land, of which 7,999 acres are in West Virginia, 1,197 in Ohio, 3,551 in Kentucky and 4,163 in Tennessee. Of the West Virginia land 3,554 acres, and in Ohio 190 acres, are wild lands on which nothing, so far, has been done. The Kentucky and Tennessee properties are wholly undeveloped. During 1902 the company purchased the stock and property of the Island Creek Coal Company, consisting of 300,000 acres of coal land in Logan and Mingo counties, in West Virginia. In addition to the coal lands, the company received the sum of $500,000 cash, and all the capital stock of the Island Creek Company, with the cash in its treasury. The exploration work shows that the coal on the Island Creek property has an average thickness of about 7 ft., and that the coal approximates in quality the Pocahontas coal.

The capital stock of the company is $6,000,000. The report shows that the gross receipts for the year were $315,577. Expenses were $124,188; leaving net receipts amounting to $191,389. From these receipts there were paid out $181,007 for new construction and $8,528 for rentals; leaving a surplus of $1,854. Adding $148,300 brought over from the previous year made a total surplus of $150,154 at the close of the year.

The report of the president, Mr. Frank W. Holden, says: "The past year has been largely devoted to erecting the buildings and other structures necessary to the actual mining of coal. The Chesapeake & Ohio branch, known as the Guyandotte Valley, will connect with our railroad at Logan, W. Va.; the railroad officials fix January 1, 1904, as the date of the probable completion of their line. The rails and bridges for your railroad have been purchased to be delivered as soon as they can be hauled over the Chesapeake & Ohio. An arrangement has been made for the operation of your railroad by the Chesapeake & Ohio Company, and the road is being built in accordance with specifications furnished by that company. The connection with the Chesapeake & Ohio, instead of with the Norfolk & Western, will probably reduce the cost of the road by approximately $150,000.

"The development of so large an enterprise as yours, including the establishment of a sawmill, the opening up of quarries of stone, the building of power house, etc., the building of nearly 13 miles of railroad track, including six bridges, all take time; but everything, including the development of the mine, we believe will be sufficiently completed to permit the actual mining and delivery of coal within 60 days after the completion of the Chesapeake & Ohio to a connection with the location of the Island Creek Railroad. There has been expended during the past year, in the development of the coal property, $169,186, and in the purchase of new coal land, $10,000. The cost of grading in the vicinity of the mines has been mostly charged to the coal properties, and only $3,413 has been charged against the railroad.

"The actual cash in the treasury October 1, 1903, with all bills paid, was $415,072, to which must be added the balance then unexpended of the railroad company of $305,125, making a total of $720,197. The money originally provided for the development and equipment of the coal properties and for the building of your railroad will, in the judgment of your directors, be more than sufficient for those purposes, and a considerable sum will probably remain for working capital, to which will be added the money to be received from the sale of the oil properties.

"It is proposed to sell the entire oil production before the actual mining of coal begins, and negotiations with that end in view have lately been begun. The net receipts from the sale of oil very nearly equal receipts last year; but the production has fallen off, notwithstanding that 45 wells have been drilled this year against 36 last year. Your company has no funded or floating debt, its only liability being the outstanding capital stock of 240,000 shares. The total number of stockholders is 1,505. The total number of men employed in the coal-field is 576, and in the oil-field 160.

"The past year has been one of great activity in development, with a complete failure to open up new pools; the price held at about $1.23 per barrel the first six months, and gradually advanced to $1.50 until the last of September, when it reached $1.62; and if the present conditions continue, even higher prices may be expected."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

L'Année Technique, 1902-1903. By A. da Cunha. Paris, France; Gauthier-Villars. Pages, 304; with 130 illustrations. Price (in New York), $1.25.

Report on the Present Position and Future Prospects of British Trade in South Africa. By Henry Birchenough. London, England: H. M. Stationery Office. Pages, 160.

Notes from the Chemical Laboratory, Department of Mines of New South Wales. By J. C. H. Mingaye. Sydney, N. S. W.: Government Printer. Pamphlet, 4 pages.

Occurrence of Monazite in the Beach Sands of the Richmond River, New South Wales. By J. C. H. Mingaye. Sydney, N. S. W.: Government Printer. Pamphlet, 10 pages.

Subject-list of Works on the Mineral Industries and Allied Sciences in the Library of the Patent Office, London. London, England: H. M. Stationery Office. Pages, 300.

Annual Report of the Chief of Engineers, United States Army, 1903. Brigadier-General G. L. Gillespie, Chief of Engineers. Washington: Government Printing Office. Pages, 724.

The Little Cottonwood Granite Body of the Wasatch Mountains. By S. F. Emmons. Washington: Reprinted for the author from the *American Journal of Science.* Pamphlet, 12 pages.

Analyses of Olivine-Basalt Rocks from the Sydney District, No. 1, New South Wales. By J. C. H. Mingaye and H. P. White. Sydney, N. S. W.: Government Printer. Pamphlet, 6 pages.

BOOKS RECEIVED.

A Text-Book of Electrical Machinery. Volume I.; Electric, Magnetic and Electrostatic Circuits. By Harris J. Ryan, Henry H. Norris and George L. Hoxie. New York, 1903: John Wiley & Sons. Pages, 258; illustrated. Price, $2.50.

As indicated by the title, this book is intended primarily for the use of students in engineering schools. With the succeeding volume, yet to appear, it aims to set forth the working principles underlying the construction of electrical apparatus, and upon are based. While space is given to the laws and principles of physics and applied mathematics, so far as they bear directly upon the subject in hand, a thorough grounding in these branches is a necessary preliminary to intelligent consideration of the work. As stated by the authors, "The book has been designed as a distinctively engineering text, not as a work on physics or applied mathematics." Volume I. discusses the laws of electric, magnetic and electrostatic circuits, and really forms an introduction to Volume II., wherein the structure and performance of electrical machinery will be presented. The text is illuminated by numerous drawings, and the general impression gained from its perusal is that the work has been carefully prepared by thoroughly competent authorities.

Ore Dressing. First Edition, 1903. By Robert H. Richards. New York and London: The ENGINEERING AND MINING JOURNAL. Two volumes; 1,236 pages; with 560 illustrations and 409 tables in the text. Price, $10.

Ore Dressing may be said to have taken its place among the applied sciences when, in 1867, Rittenger brought out his 'Lehrbuch der Aufbereitungskunde.' Gaetzsmann's elaborate descriptive work, on the same subject, was already in the course of publication, and its completion, and the appearance of a number of minor books and papers, soon after, provided the new science with a comparatively satisfactory literature. Since then, the practice of ore dressing has developed very rapidly, and the literature of the subject has grown to be exceedingly voluminous; but it is a significant fact that, while America has led in the material development of the industry, and has done its full share in producing books and papers on special sections and details of the subject, yet it has been left to the Fatherland of ore dressing to supply practically all of the general works and text-books which have heretofore appeared.

Linkenbach, Bilharz, Kirschener and others have successively given us good, general works, which have, however, been devoted chiefly to Continental practice; but, until now, we have never had any comprehensive treatment of the subject in English, and still less have we had any general statement of American practice.

At last this reproach is removed, and, instead of having to go to Germany and Austria for our text-books, and to the technical journals of our own country and others for practical details, we now have spread before us, in one work, a very full statement of ore-dressing theory, both classic and modern, and such a wealth of fact, practice and detail as has seldom, if ever before, been put together in any single work or any branch of engineering.

Professor Richards' whole life has been spent in the service of the mineral industry, and from the beginning he has given his chief attention to ore dressing; and, although his main work has been that of a teacher, he has always kept in close touch with the professional side of his subject. As the originator of the present-day system of laboratory teaching, he has been at all times in the best possible position to check practice against theory, and thus to study the development of both in the best possible manner.

The book is characteristic of its author. "Theory," he says in the preface, "should be described after practice;" so we have descriptive matter first in all cases; but the theory is not neglected when its time comes, and in this feature the book will prove most interesting to many readers, for the author gives us not merely his own views, with the reasons for them, but quotes very freely from the writings of others at home and abroad. Students who are unfamiliar with German, and professional men who lack the time or opportunity to consult libraries, will thus find the book especially useful. In many cases the author is not content in merely stating and explaining the theory, so far as it is now known, but also gives details of experimental work, that is, as yet, more or less inconclusive, and thus opens up to us new fields of research, and tempts us to join him in his studies.

The scope of the work is clearly stated in the preface: "The aim of the author has been to present to the readers modern American practice, referring, for comparison, to European; and to so expound the principles of the art, as at present understood, as to make advance easy in the future.

"The ground covered includes the mechanical preparation of useful minerals other than coal. Although the principles underlying the treating of coal are largely the same, the treatment itself is distinct and specialized;" and to have included it would have much postponed the appearance of the book. Gold and silver milling are not omitted, and are, in fact, very well presented, although "less dwelt upon than other concentration, because the works of Lock, Louis, Rickard and Rose, taken together, give a very complete treatment of the subject, and also because an exhaustive treatment of amalgamation appears to belong more to metallurgy than to ore dressing."

The scheme of the book is essentially practical; the subject is divided into four main parts:

I. Crushing.
II. Separating, Concentrating and Washing.
III. Accessory Apparatus.
IV. Mill Processes and Management.

Each part is, again, divided into chapters on classes of machines; these, again, into numbered sections, each describing a single machine or discussing some special principle involved. As an indication of the elaborateness of detail, the five chapters describing breakers, rolls, crushers and stamps cover 290 pages, and contain 184 cuts and 168 tables.

Following this descriptive matter there is a chapter on the laws of crushing, in which both theoretical and practical considerations are treated, and an attempt is made to approximately determine the operating costs, wear and tear, consumption of power, etc. A valuable feature of this chapter on the laws of crushing is a summary of the elaborate investigations carried out some years ago by Von Reytt, which, we believe, has never heretofore been fully reviewed in English. Professor Richards not only states Von Reytt's conclusions, but gives us the main part of his very interesting tables.

The second part of the book comprises 525 pages, the several chapters being on washers, sizing screens, the principles of sizing, classifiers, laws of classification, hand-picking, jigs, laws of jigging, sand and slime concentrating, amalgamation and miscellaneous processes. This portion of the book contains 290 cuts and 184 tables, and in general character is very similar to the section already described.

The third part, which is comparatively brief, describes and discusses sampling, feeders, distributors, conveyers, elevators, pumps and sand-wheels. This matter is all compressed into one chapter of less than 40 pages, and is, therefore, treated with less detail than might have been expected from the previous parts of the book.

The fourth part of the work is again voluminous, the first chapter on mill schemes covering 200 pages, and the second, on general ideas, another hundred. These last two chapters will prove the most useful in the book to many engineers, as they include the detailed outlines of nearly one hundred mills, so stated that comparisons are made as easy as possible. These mills have been carefully chosen to represent modern practice, and the author and his assistants have done an incredible amount of work in securing the information, and in tabulating and preparing the schemes; and in this connection it is worthy of note that the extremely detailed statements of construction and operation of machines, as set forth in the earlier parts of the book, are all referred, by a system of numbers, to these complete mill schemes, thus making it possible to follow out any scheme to its minutest detail; or, if working from the other end, to determine the general conditions in the mills of nearly all of the special mechanisms described in the earlier parts of the book.

An unfortunate feature of this last part of the book is fully appreciated by the author, who says, in the preface: "The detailed study of the mills has taken several years, and during these years the Wilfley table has appeared—a most fortunate event for the cause of ore dressing; but it could not have happened at a more inopportune time"—for the author. The Wilfley table has been finding its way into mills of almost every description, with the result that most of the schemes, as at first prepared, have had to be re-written, while others have no doubt been changed since the book went to press.

In closing this last part of the book, the author gives nearly 40 pages to testing, both in the mill and the laboratory. The ordinary testing tools are described, special pieces of apparatus are figured, and a number of cases of testing are treated. This whole section is eminently practical, and, in view of Professor Richards' especial fitness to discuss this part of the subject, it is to be regretted that he has not treated it even more thoroughly.

The scheme of the book, as a whole, is admirable; and if fault be found with its working out, the blame should go more to the times, and to the Wilfley table, than to the author. Professor Richards has evidently tried to describe present-day practice with all the detail that Gaetzsmann and others gave to the German practice of their times, and, in his attempt to do this, has been forced to print an enormous mass of detail. Scores of machines are figured and described with almost the minuteness of modern trade catalogues, and, as much of this machinery is likely soon to be superseded by more modern apparatus, one at first wonders whether its description could not have been omitted or curtailed. The error, if any, is, however, on the right side. The very nature of the book precludes its use as a text-book, and, if we are to consider it what it really is—a manual and almost an encyclopedia of its subject—no amount of accurate information, however secondary, can be considered altogether out of place.

To the practicing engineer and mill-man, the great value of the book will be found in its tables; first, those already described, setting forth mill schemes and discussing them at length; and, second, those in the earlier part of the book, which treat of the detailed construction and operation of special kinds of apparatus. These latter tables number, all told, almost 400. Some of them are very extended, and give elaborate details of practice, from the primary matters of the quantity and quality of ore supplied, output, power consumption, etc., to the minutiæ of mechanical construction and adjustment. For example, table 283, on 'Purposes and Adjustments of Jigs,' occupies 20 pages and tabulates over 300 jigs in respect to size and material of feed, dimensions of sieves, material of bed, character and destination of products, plunger throw, speed, etc., to a total of 20 columns. Other tables give additional information about the same jigs, and all, or nearly all, are accompanied by notes, and by explanations and further information in the text.

To the student of ore dressing, the book will prove of the greatest possible assistance. Heretofore, as already indicated, a study of the subject has involved reference to original publications in German and French, and to innumerable isolated and frequently unimportant articles, scattered through the

scientific and technical press of the last half century. Professor Richards has managed to include in his pages brief abstracts of a very large part of all that is worth reading in this mass of miscellaneous literature; and has, furthermore, been at great pains to give credit in all cases. He thus, at once, saves his readers the trouble of doing an immense amount of more or less barren reading, and at the same time provides them with a very full bibliography, in which most of the references are provided with brief descriptive comments. This bibliographic feature of the book is extremely valuable, and, when compared with the most thorough indices in existence, it shows remarkably few errors and omissions.

The two volumes are well printed, and contain fewer errors than is usual, in the case of first editions of works of so technical a character. Such errors as there are of this kind can easily be corrected in the second edition, which the author virtually promises when he asks for criticisms and suggestions to aid in future publications. In this connection, it is to be hoped that mill managers, who read the book and profit by the practical details given in its pages, will not only send additional information to the author, but will, in particular, give him permission to publish "data of efficiency of processes," etc. It is easy to see that the present work could have been made much more useful had its author been permitted to "give away" some of the private information that has come to him in his professional experience. In no industry is the publication of the trade secret less likely to do harm, and more certain to do good, than in mining and ore dressing, and a great advance will have been made when the managers of certain of our great mills can be brought to realize this fact.

The author says that, by 1905, the adaptation of the mills to the Wilfley table will be complete. Let us hope that this will also be the date of the new edition, which can then be considerably simplified and modernized, in respect to its mill schemes and certain other matters. These changes, and the improvements that naturally accompany revision, and possibly some pruning out of redundant and repeated matter, will make the book altogether admirable, especially if the author can, in the meantime, find time to prepare a section on coal cleaning, and thus round out his survey of the subject.

In the meanwhile, we can congratulate Professor Richards on having produced the best book ever written on ore dressing, and on having conclusively established his right to be considered the highest living authority on that subject. P.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

The Use of Names in a Prospectus.

Sir.—Enclosed please find a clipping relative to myself, appearing in a circular issued by what is called the X-Ray Gold Mining Company. You will find also enclosed copy of a letter I have written to Mr. Dooley, who seems to be at the head of this company, and which explains itself. I signed the letter shown by this clipping, but I did not authorize anyone to use the name of the American Mining Congress in any sense to assist in selling stock, good, bad or indifferent. I am not in a position to state with certainty very much relative to this matter, other than I have stated in the letter, as shown by this clipping, but I do not want my name as president of the American Mining Congress connected with any such transaction, as I feel that this name does not belong to me, but to the Congress, and should not be used for any such purpose.

J. H. RICHARDS.

Boise, Idaho, Nov. 23, 1903.

The following is the clipping from the circular to which Mr. Richards refers in his letter:

"Boise, Idaho, Oct. 3, 1903.

"TO WHOM IT MAY CONCERN:

"Having had much experience in developing mining property in the immediate vicinity of the property owned by the X-Ray Gold Mining Company, near Boise City, Idaho, I am quite familiar with conditions existing there. Present development on a number of the claims included in the property of the above company makes a very flattering showing. From the showing made in present development and the general character of the veins in that section, there is every reason to justify further and more systematic and permanent development by this company. While no one can see beyond present openings, there is good reason to believe that reasonable development of this property, coupled with careful management, will insure the success of this undertaking. Investigation will demonstrate the correctness of the foregoing statements. Respectfully,

"(Signed) "J. H RICHARDS."

"(The writer of the above is the prominent gentleman so widely known as 'Judge Richards,' President of the American Mining Congress so recently convened in Deadwood, South Dakota. And as his position at the head of the mining congress would indicate, he probably has no superior and but few equals either as a corporation attorney or a mining expert.)"

We append also copy of Mr. Richards' letter to Mr. Dooley, also referred to above:

"November 23, 1903.

"Mr. J. C. Dooley,

"508 Manhattan Building, Des Moines, Ia.

"DearSir:—Your favors of the 16th and 19th inst. just received. In reply will state that I notice in your publication you have published the letter which I gave you, following this letter with a statement that I am President of the American Mining Congress, etc. Now, Mr. Dooley, this title of President of the American Mining Congress does not belong to me; it belongs to the Congress, and I have no right to permit that name to be used for the purpose of selling mining stock. I therefore desire you to recall that statement and strike it out. I also notice in your prospectus many things that I do not wish to endorse. The company is not in very good repute here, and for these reasons I desire to have my name disconnected with the matter, so far as selling the stock is concerned, and especially with regard to my being President of the American Mining Congress, as stated above. I stated nothing in the letter that is not correct, but I certainly have no right to permit my official position to be used to influence people to buy stock in a mining enterprise. Trusting you will promptly comply with my request, I remain,

"Very truly yours,

"(Signed) J. H. RICHARDS."

(Mr. Richards' protest against the attempted use of his position, as president of the American Mining Congress, as an advertisement deserves cordial endorsement. No promoter has any right to make such use of an official position.—EDITOR.)

A CONCRETE CHIMNEY.—A chimney of concrete, 180 ft. high and 15 ft. in diameter at the top, with a flue diameter of 11 ft., has recently been built for the Pacific Electric Railway Company at Los Angeles, Cal. The chimney is constructed on the Ransome system, the concrete being reinforced, both vertically and horizontally, with square, cold-twisted steel bars. The horizontal reinforcement consisted of rings of 0.25 in. steel twisted bars, placed at intervals averaging 18 in. in the inner shell and 24 in. in the outer. Vertical bars of 0.75-in. steel, twisted, were placed 1 ft. apart in the lower third of the chimney, 2 ft. apart in the middle section, and 4 ft. apart in the top section of the outer shell. In the inner shell, 0.25-in. bars were used, spaced about 3 ft. apart. The chimney contained approximately 20,000 cu. ft. of concrete, 10,000 lb. of twisted steel bars, and 4,000 lb. of old rails, the last being placed 12 in. apart, in two layers, in the base. About 850 bbl. of cement were used in the construction. The weight of the chimney is approximately 1,430 tons, the distributed load at the base being somewhat less than 2 tons per square foot.

RECENT DECISIONS AFFECTING MINING INDUSTRY.

SPECIALLY REPORTED.

EXTRALATERAL RIGHTS IN SECONDARY VEINS, ETC.—Under the laws of the United States (United States *Compendium* 1901, p. 1425), providing that the owners of lode mining claims shall have the exclusive right to all lodes and ledges throughout their entire depth, the top of the apex of which lies inside the surface lines of the claim extending downward vertically, although such lodes may so far depart from a perpendicular as to extend outside the vertical sidelines, and that the right to possession of such outside parts of the veins shall be confined to such portions as lie between vertical planes drawn downward through the end-lines of the location so continued in their own direction that such claims will intersect such exterior parts of such veins or ledges, the owner of a lode mining claim has extralateral rights to secondary veins, apexing within the surface lines of his location, although such secondary veins do not apex within the same segment of the claim in which the apex of the discovery vein exists; and while the end-lines of the location must constitute the end-lines of all veins apexing within the surface boundaries, and may be the boundary planes for such extralateral rights, yet the bounding planes of these veins, though they must be drawn parallel to the end-lines, need not be coincident.—Ajax Gold Mining Company v. Hilkey (*72 Pacific Reporter*, 447); Supreme Court of Colorado.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.: preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Quicksilver Furnaces.—Who are the makers of cinnabar reduction, or quicksilver, furnaces? What is the latest type of reducing furnace? I want to get, especially, furnaces of the continuous type.—A. C. S.

Answer.—A quicksilver furnace is largely built on the ground, using bricks, tiles, etc. No manufacturers furnish the furnace complete, only supplying the necessary iron work. As nearly all the furnaces in this country are in California, the mining machinery houses in San Francisco have been the builders, and have supplied the machinery required. The latest types of furnaces in use on the Pacific Coast are the Scott continuous and the Scott-Kuttner. The Cermak-Spirek is a new type used in Europe.

A full account of the various furnaces in use is given in the excellent bulletin on the 'Quicksilver Industry of California,' recently published by the California State Mining Bureau.

Infusorial, or Diatomaceous Earth.—What is the value of infusorial earth? What is it used for, and what is the demand?—E. H. C.

Where is infusorial earth found in quantities? What is the consumption? What would be the value

of a deposit, quite pure? Could the market stand a large increase in supplies, without breaking down the price?—E. L. G.

Answer.—Infusorial earth is mined in Maine, New Hampshire, Massachusetts, Missouri and Nevada. It is found in other localities. It is used as an abrasive; to make polishing powders and the like; for filtering; and sometimes in making refractory bricks. The production in the United States last year was 4,855 short tons. The current price, delivered in New York, is $20 per ton for American. The French and German articles bring a higher price, because they are more carefully prepared for market. It is probable that any large addition to the supply would bring down prices.

Manganese Ore.—As there seem to be no purchasers of manganese ores on the Pacific Coast, I would like to know the names of buyers in the East; also the value of an ore running about 50 per cent manganese.—B. A. H.

Answer.—The chief buyers in the East are the large steel companies. The Carnegie Steel Works, at Pittsburg, and the Illinois Steel Works, Chicago, both owned by the United States Steel Corporation, are the chief buyers. A 50 per cent ore will bring about 25c. per unit of manganese—that is, $12.50 per ton, provided it does not carry over 8 per cent silica, and 0.1 per cent. phosphorus. Deductions are made for all silica and phosphorus in excess of the limits given. The price for ores lower in manganese is somewhat below that named above; a 40 per cent ore, for instance, bringing only 22c. per unit.

Potassium Nitrite.—How is potassium nitrite prepared on a commercial scale?—W. C. S.

Answer.—Roscoe and Schorlemmer's 'Treatise on Chemistry,' Volume II, page 246, says: "Potassium nitrite is formed when saltpeter is heated until one-third of the oxygen is evolved, the decomposition taking place more readily in the presence of metallic iron, copper or lead. Two parts of lead may be employed to one of saltpeter; the latter salt is fused and the fused mass heated to dull redness, the lead then added little by little, and the cooled mass lixiviated with water. By evaporation, or by neutralizing the solution in the cold with dilute sulphuric acid, and adding two parts of alcohol by weight, the nitrite will be precipitated in crystal form. Pure potassium nitrite is best prepared by decomposing silver nitrite with potassium chloride, or by decomposing amyl-nitrite with the exactly necessary quantity of alcoholic potash."

The process first mentioned is also described briefly in Remsen's 'Inorganic Chemistry,' page 494, and on the basis of cost is probably the best method for making nitrite in commercial quantities.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

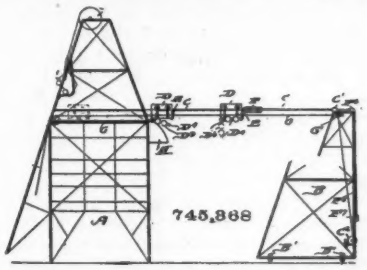
The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared:

Week Ending December 1, 1903.

745,357. TESTER FOR BLAST-CAVITIES. Calbreith B. Lanham, Pittsburg, Pa. In a tester for blast-cavities, a main protecting casing, a measuring chain adapted to operate within the same, means for operating the chain, and means for directing the chain.

745,362. LOADING OR UNLOADING APPARATUS.—Calvin A. Long, Soldier, Kan. In an apparatus of the character described, a scoop-shaped box, arms pivotally secured to the opposite sides of the box, springs formed integral with the lower ends of the arms, and stops secured to the lower portion of the said sides to limit the tipping of the box.

745,368. ORE CONVEYER.—Alexander McCain and Thomas C. Grierson, Eveleth, Minn. A device comprising a derrick and a tower, an elevated track connecting the derrick and tower, a car movable on the track, a buffer movable on the track, a plurality of rollers arranged on the sides of the buffer and adapted to engage the upper



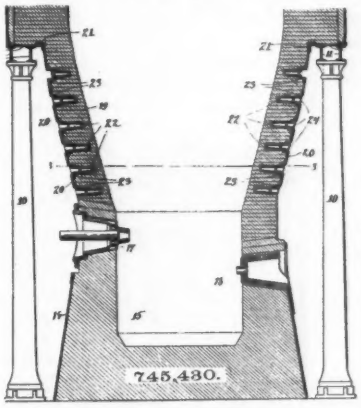
and lower surfaces of the track, respectively, and means for holding the buffer in position.

745,373. UTILIZATION OF COMPRESSED AIR.—Robert Nutty, New York, N. Y. An engine, one or more operating tanks connected directly to said engine, and adapted to contain propulsion gas or fluid under pressure, in combination with one or more auxiliary or feed tanks adapted to contain a similar gas or fluid under a higher initial pressure than that in the operating tanks, and a body of water contained in the said auxiliary tanks; a valved pipe connecting the operating and the feed tanks, whereby the gas or fluid withdrawn from said operating tanks to run said engine is replaced by water from said feed tanks; and means for heating said water during its passage through said pipe.

745,378. ELECTROLYTIC REFINING OF ZINC.—Heinrich Paweck, Vienna, Austria-Hungary. An electrolytic process of depositing zinc by electrolyzing in a bath containing zinc salts, conductive salts and boron compounds.

745,416. MORTAR AND MULLER FOR GRINDING, CRUSHING AND MIXING ORES, CHEMICALS, ETC.—Thomas Breakell, Wirksworth, England. A grinding or levigating machine comprising a rotary pan or mortar having a flat bottom surface surrounded by an upwardly projecting curved rim and a conical extension or outer rim, a rotary muller eccentrically mounted in said pan and provided with a flat bottom surface and curved lower edge adapted to correspond with the aforesaid curved rim in the pan and means for positively rotating the pan.

745,430. SUPPORT JACKET OR FRAME FOR COOLING PLATES OR COILS IN BLAST FURNACES.—Austin Farrell, Gladstone, Mich., assignor of one-half to William G. Mather, Cleveland, Ohio. A blast furnace, the bosh wall of which is encircled by a metal jacket having a



series of superposed holes formed therein, said holes being separated by integral portions of the jacket, said jacket being provided with projecting supports about said holes, and cooling plates or coils extending into the body of the bosh wall and suspended at their outer ends by said supports of said jacket.

745,433. ORE OR COAL CHUTE.—Howard Greer, Jr., Chicago, Ill. The combination of a rising and falling oscillatory chute, a flexible connection secured to said chute and extending for a part of its length horizontally a counterweight supported on said horizontal portion, and means for raising said counterweight.

745,448. EXCAVATING AND DREDGING BUCKET OR GRAPPLE.—Charles A. Marrder, New York, N. Y., assignor of one-half to the Hayward Company, New York, N. Y. In an excavating or hoisting bucket, the combination of scoop sections or jaws, a head-block, links connecting the head block to the scoop sections or jaws, a foot-block operating arms pivoted to the foot-block, a strike block, lever arms, means for spreading the lever arms from the strike block, and an operating cable or chain, the foot block receiving the impact of the strike block.

745,450. SEPARATOR.—William V. Meyer, Chicago, Ill. In a separator, the combination of a frame; a screen movably mounted in said frame, being open at the top and bottom and having annular vertically disposed perforated walls; means within the screen, rotatable relatively thereof and adapted to discharge particles of matter outwardly against said screen; means for causing said screen to vibrate horizontally; and a suitable casing surrounding said screen and adapted to gather the particles which pass through said screen.

745,470. APPARATUS FOR THE DISTILLATION OF AMMONIACAL LIQUORS.—George Wilton, London, England. In apparatus for the distillation of ammoniacal liquors the combination with each tray or chamber of inlet and outlet orifices disposed at opposite sides of said trays or chambers, and an elongated steam opening and baffle-hood therefor between said inlet and outlet orifices, said orifices being of relatively large size, so that a large quantity of liquor is passed through the trays, and said baffle-hood being extended substanially across the full width of the tray so that it opposes the passage of the liquor from one side of the tray to the other, whereby substantially all the liquor is caused to pass over the hood, and is thereby subjected directly to the action of the steam.

745,472. APPARATUS FOR TREATING ORES.—William H. Adams, Jr., Los Angeles, Cal., assignor of one-third to Omar H. Hubbard, Los Angeles, Cal. The combination of a tank, a box, a pipe at the top of the tank connecting the same with the box, a pump connected with the box, and nozzles connected with the pump and arranged to discharge liquors into the tank at intervals tangentially in an approximately horizontal plane.

745,479. ANODE HOOK.—Frank W. Cann, Brooklyn, N. Y. The combination with an anode plate provided with a threaded recess, of an anode hook for electroplating-baths, comprising upper and lower parts threaded at their adjacent ends, the former part having provision for hanging the device and the latter part having a thread for engaging the recess of the anode plate, and an interiorly threaded coupling sleeve for detachably connecting said adjacent ends.

745,490. PROCESS OF EXTRACTING PRECIOUS METALS.—Thomas J. Grier, Lead, S. D. A process of extracting precious metals from slimes, consisting in subjecting slimes to the action of cyanide solution, whereby the watery portions of the slimes may be displaced by the cyanide solution, the latter being of greater density than the water of the slimes, then treating the charge with compressed air and afterward displacing the cyanide solution with a salt solution of greater density than the cyanide solution.

745,546. COMPOUND OF PHOSPHORUS AND SULPHUR AND METHOD OF MAKING SAME.—Edwin W. Wheelwright, Birmingham, England. The process of manufacturing solid compounds of phosphorus and sulphur which consists in mixing sulphur and phosphorus at a temperature above 165° C., and in proportions in which white phosphorus is present in greater proportion than is requisite for producing sesquisulphide of phosphorus.

745,560. GRINDING MILL.—George A. Bell, Port Huron, Mich., assignor of one-half to Herbert W. Smith, Port Huron, Mich. In a grinding or crushing mill, a pair of revoluble disks having co-operating beveled faces, shafts carrying said disks, bearings for the support of the opposite end portions of said shafts, driving pulleys of different diameters mounted on the respective shafts to transmit revoluble movements to said disks in opposite directions and at different speeds, and a spring acting on one of said shafts to maintain the disks in operable relation and permit separation of said disks on the entrance of unyielding material between said disks.

745,588. ELECTROLYTIC APPARATUS.—Henry B. Ford, New York, N. Y., assignor to Swan Electric Manufacturing Company. In an electrolytic apparatus, a negative pole electrode comprising a plate of conducting material, such as copper, inclosed in a porous cup containing also mercury and highly electropositive metal.

745,589. ART OF DEVELOPING AND UTILIZING FLUID PRESSURE.—Joseph C. Fraley, Philadelphia, Pa. A method of developing, cumulatively transmitting and maintaining pressure, which consists in establishing a plurality of fluid columns, connected in series by interposed confined bodies of lighter fluid, extending from the base of each column of heavier fluid to the upper portion of the next column of such heavier fluid in the series; utilizing the cumulative pressure for the discharge of fluid from the regions of ultimate pressure; supplying fluid to said region; and maintaining said columns in unstable equilibrium.

745,635. METHOD OF MANUFACTURING GAS.—Charles W. Lummis, Cleveland, Ohio. A mode of generating carbon monoxide or producer gas, said mode consisting in introducing into a highly-heated chamber, powdered coal, and combining therewith air and steam in volume so limited as to provide only sufficient oxygen to effect such conversion of the coal into carbon monoxide.

745,637. PROCESS OF PRODUCING CARBON CHLORIDES AND SILICON.—Florentine J. Machalske, Brooklyn, N. Y. A process of producing carbon chlorides, which consists in causing a substance containing carbon and a silicon chloride to react under such conditions that the carbon is combined with the chloride of the silicon chloride.

745,639. GRINDING OR CRUSHING HEAD.—Volney W. Mason, Jr., New York, N. Y. A grinding or crushing head comprising a core having a plurality of longitudinal dovetailed grooves therein which extend from the bottom to a point short of the top, and a corresponding number of external segmental plates mounted thereon, having longitudinal dovetailed ribs projecting from the inner faces

thereof, which extend from the bottom to a point short of the top, and which enter said grooves, and a locking device for each segmental plate.

745,640. GRINDING OR CRUSHING HEAD OR ROLL.—Volney W. Mason, Jr., New York, N. Y. In a grinding or crushing head or roll, a core having one or more continuous external circumferential grooves, and also having a plurality of longitudinal dovetailed grooves crossing said circumferential groove or grooves, a corresponding number of segments mounted on the core, each having a dovetailed rib to fit said grooves, and also having one or more key-receiving recesses crossing said rib opposite the circumferential grooves in the core, and a plurality of curved keys contained in said circumferential groove or grooves which are arranged in alignment and enter the transverse recesses in the segments, and means for holding said keys in place.

745,653. HOISTING BUCKET.—Almon E. Norris, Cambridge, Mass., assignor to Rawson & Morrison Manufacturing company, Cambridge, Mass. In a clam-shell bucket, a bucket-segment having at its upper rear end substantially vertical sides, and a horizontal back or bottom, and at its jaw end a substantially half-round or semicylindrical shape.

745,659. ROPE RAILWAY.—Rudolf Pfaffenbach, Leipzig, Germany, assignor to Adolf Bleichert & Co., Leipzig-Gohlis, Germany. In a rope railway having a curve, a series of frame structures, a plurality of fixed ropes or tracks extending around the curve and each supported by the frame structure exclusively from the concave side of said curve, carriages upon said ropes or tracks and having hangers, said hangers being disposed to fall on the convex side of the curves formed by the rope or track, and traction ropes disposed below said tracks.

745,676. STEAM SHOVEL.—William S. Russell, Toledo, Ohio. The combination of a frame, wheels provided with gears, a propelling shaft composed of two sections provided at their outer ends with pinions meshing with the said gears, gearing connected with one of the sections of the propelling shaft, a clutch mounted on the other section of the shaft for coupling and uncoupling the sections, and means for driving the gearing.

745,694. FUSE BLOCK.—Milton R. Utley and Benjamin J. Clements, Chicago, Ill., assignors of one-third to Samuel Insull, Chicago, Ill. In a strong current protector, the combination with a pair of fuse terminals and a fuse normally held under tension between them, one of said terminals being movable and actuated by a spring to separate the terminals and break the arc when the fuse blows, an inclosing case, and a target normally held concealed within the case by said movable fuse-holder, said target being adapted to be released by the movement of the fuse holder and to fall by gravity into a position of display, whereby the blowing of the fuse is indicated outside the case.

745,705. PULVERIZER.—William M. Wheldon, Boston, Mass., assignor to the Aero-Pulverizer Company, Jersey City, N. J. In a pulverizer, the combination of an inclosed casing, a series of rings or diaphragms mounted in said casing side by side to form a pulverizing chamber having peripheral slots, each ring being formed with an outwardly flaring inner face, whereby the minimum space between the rings is coincident with their inner faces, a shaft extending into said pulverizing chamber, and a plurality of pulverizing paddles mounted on said shaft.

745,710. ORE CRUSHING MACHINE.—Harrison Yarnell, Pasadena, Cal. An ore crushing machine comprising a mortar having tapering sides provided with screens; a circular tread in the bottom of said mortar adjacent to the inner side; a circular tread in the bottom of said mortar adjacent to the outer side; an amalgamating trough between said treads; two sets of revolving crushing rolls adapted to travel on said treads, the set on one tread traveling intermediate the set on the other tread, whereby one set of crushing rolls pushes uncrushed ore into the path of the other set of crushing rolls; means to drive said rolls comprising a weighted driving wheel revolubly mounted therein having removable treads resting upon and supported by said rolls and adapted on the revolution thereof to impart motion to said rolls by contact with the periphery thereof.

745,739. CONVEYER.—Charles Rasmussen, Racine, Wis. A clip for connecting a belt and slat in an endless conveyer, this clip consisting of a single piece of suitable metal shaped to form a belt loop and to have one of its ends offset from the loop but parallel to the other, barbs struck from the metal into the loop at right angles in opposite directions, flanges extending inward from said ends of the clip longitudinally of the same, a tongue struck up from one of the clip ends, and the other of said clip ends provided with adjacent openings with which the tongue is engaged subsequent to its engagement with a slat opening.

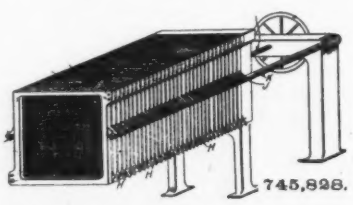
745,765. ORE ROASTING FURNACE.—Aaron M. Beam, Denver, Colo., assignor to the National Automatic Furnace Mills and Mining Company, Denver, Colo. In an ore-treating furnace, the combination of a combustion chamber, a stack chamber, and a revoluble roasting cylinder comprising an ore cylinder and a flue cylinder surrounding said ore cylinder, said flue cylinder communicating with said combustion chamber and stack chamber and said ore cylinder extending through said combustion chamber.

745,781. GAS-PRODUCER.—Grant Campion and Mott Wyant, Anderson, Ind. In a gas-producer, the combination with the shelving portions of the interior wall, of pyramidal ridge-grates, alined with said shelving portions.

745,786. MACHINE FOR FIBERING METALS.—Albert L. Cole, Auburndale, Mass. In a machine for forming a continuous metal fiber or filament, the combination of a rotary wheel provided with a groove of the size of such fiber or filament and a melting-tank provided with means for regulating the flow of the metal in quantities necessary to form said fiber or filament.

745,802. NITRO PRODUCT.—Lazar Edeleanu and Grigore A. Filiti, Bukharest, Rumania. As a new article of manufacture, a nitro product obtained from heavy petroleum distillates, and consisting of semi-solid or solid reddish-brown substances, having elastic properties, and soluble in alcohol, very soluble in acetone and soluble generally in organic solvents, and producing explosives when mixed with oxidizing media, dissolving in strong potash lye with the result of a black-brown color solution, producing brown or black coloring-matters when fused with alkaline sulphides, producing celluloid-like substances when worked up with guncotton and producing varnishes when mixed with solvents.

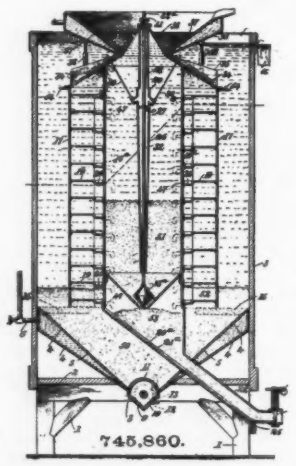
745,828. PROCESS OF EXTRACTING METALS FROM ORES.—Ernest B. Hack, Denver, Colo., assignor to the American Filter Press Extraction Company, Denver, Colo.



A process of treating ores, consisting in forming the pulp into cake and subjecting the cakes to the leaching action of a suitable solution in the presence of compressed air which is introduced simultaneously with the solution and continued during the leaching operation.

745,843. CHROMATE OF SILVER.—Carl H. Von Hoessle, Radebeul, near Dresden, Germany, assignor to Chemische Fabrik von Heyden Actiengesellschaft, Radebeul, near Dresden, Germany. A product, colloidal chromate of silver, being a dark-colored powder of neutral reaction, insoluble in alcohol and ether, soluble in water forming a dark-colored fluorescent solution, containing the chromate of silver (Ag_2CrO_4) in soluble form.

745,860. ORE CONCENTRATOR.—Ezra W. Keeler, New York, N. Y. An ore concentrator, comprising a central vessel to hold concentrates, an outer vessel to hold waste



material, and a number of chutes connected with said central vessel and provided with by-passages leading into said central vessel, said chutes being in part composed of plates coated with quicksilver, and being provided with swinging members to allow the removal of said plates.

745,868. SHEET-METAL FLUME.—Myron H. Laybourn, Windsor, Colo. A flume-section shaped to form a conduit open at the top, and provided with a metal band permanently secured to one end of the section exteriorly and extending across the top thereof.

745,870. APPARATUS FOR SEPARATING AND COLLECTING CONDENSABLE CARBONACEOUS SUBSTANCES.—Leon P. Lowe, San Francisco, Cal.—The combination of the separator-box having a series of partitions extending upward from the bottom of the box and dividing the same into a succession of compartments, a partition extending upward to a lower level than the first partition, a wall in front of said latter partition, spaced from the bottom of the box to permit the waste water to pass below said wall, a screen at a lower level than the top of the lowest partition and filtering material placed on said screen through which the water is compelled to pass, and means for drawing off the water passing through said filter.

745,949. GOLD-SEPARATOR.—Morris C. Wright, Sultan, Wash. A gold separator comprising a flume for connection with the discharge end of a sluice-box, an inclined slatted bottom in the upper portion of the said flume, a steeply-inclined bottom leading from the lower end of the slatted bottom, a chamber below the said slatted bottom having an inclined solid bottom, a second flume at right angles to the first-named flume and into which the inclined solid bottom of the said chamber discharges, the second flume being set in an inclined position, a reversible angular portion set in the said second flume at the discharge of the first flume to deflect the gold-bearing sand in a downward direction in the lower portion of the second flume, and gold-collecting boxes set in the said second flume and having tops formed of fabric material.

745,958. MANUFACTURE OF SODIUM.—Thomas Ewan, Glasgow, Scotland, assignor to the Cassel Gold Extracting Company, Limited, Maryhill, Glasgow, Scotland. An improved process for manufacturing sodium which consists in subjecting fused sodium hydroxide to the action of the electric current and separating the metal produced at the cathode from the water and anodic oxygen produced at the anode by a porous diaphragm the main constituent of which is alumina (Al_2O_3).

745,960. APPARATUS FOR SEPARATING GRAPHITE OR OTHER MATERIALS FROM ASSOCIATED IMPURITIES.—Israel F. Good, Allentown, Pa., assignor of one-half to George Francis Pettinos, Bethlehem, Pa., and John Herbert Harris, Allentown, Pa. An apparatus comprising a rotary receiving-table, and pneumatic means for holding the finer particles of graphite thereon while the coarser portions escape.

745,966. PROCESS OF PRODUCING SILICON CHLORIDES, HYDROCHLORIC ACID, AND ALKALI HYDROXIDES.—Florentine J. Machalske, Chicago, Ill., assignor of one-half to Charles Herbert Lyon, Chicago, Ill. The process of producing chlorides of silicon, which consists in electrically heating an oxide or salt of silicon and a chlorine compound to a temperature sufficient to cause the materials to react upon each other with the production of a chloride of silicon.

745,968. BRIQUET-MACHINE.—Frederick Meyer, Chicago, Ill., assignor of five-sixths to Eugene J. Kirby, Chicago, Ill., and the Chicago American Fuel Briquetting Company, Chicago, Ill. In a compressing-machine, the combination of a frame; a mold movably mounted in said frame; suitable feeding mechanism for supplying material to said mold; a plurality of plungers disposed in said frame, apart from said feeding mechanism, in parallel relation to said mold and longitudinally slidable in said frame; suitable mechanism for moving said mold successively into alinement with each of said plungers; said plungers being arranged to enter said mold and compress the material therein to successively varying degrees of compression; and means for discharging said material from said mold after same has been operated upon by said series of plungers.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending November 14, 1903.

15,280 of 1902. OIL CONCENTRATION.—J. B. Schammell, London. Using oil, containing a small quantity of chloride of sulphur, for catching metallic particles out of ore.

24,152 of 1902. CLEANING BLAST-FURNACE GASES.—B. H. Thwaite, London. Improvement in the inventor's apparatus for washing blast-furnace gases to make them suitable in gas engines.

24,900 of 1902. COAL AND ORE SCREEN.—J. P. Waldie and H. O'Connor, Edinburgh. A screen for sizing coal or ores, made in the form of centrifugal separator, the material being fed at the middle, the smalls passing through the sieve, and the larger pieces passing up and over the edge by centrifugal force.

762 of 1903. CONVEYOR BELT.—F. Baum, Herne, Germany. Method of constructing conveying belts for drying washed ores, in such a way that the fines do not pass away with the water, but actually form a filtering material for fines following.

16,582 of 1903. BRIDGE FOR CONVEYOR BELTS.—Robins Conveying Belt Company, New York, U. S. A. Improved form of suspension bridge for holding traveling conveying belts, where the ore is to be conveyed long distances, such as across a valley.

19,516 of 1903. SPRING STAMP.—W. A. Dalton, Tucson, Arizona, U. S. A. Improved connections for driving spring stamps, and for rotating the stems continuously.

19,783 of 1903. SULPHIDE RECOVERY FROM TAILINGS.—G. D. Delprat, Broken Hill, N. S. W., Australia. Improvements in the inventor's process for recovering sulphides from tailings, by passing them into a bath of bisulphate of soda.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London.

NOTE.—The ENGINEERING AND MINING JOURNAL is desirous of obtaining certain back numbers and volumes, and would be willing to pay a liberal price for them. Those wanted are volumes 53 and 54 (1892), complete; No. 19 of volume 51 (May 9, 1891) Nos. 3 and 24 of volume 60 (July 20 and December 14, 1895); the index to volume 63 (1896) of the ENGINEERING AND MINING JOURNAL. Anyone having any of these numbers to dispose of will oblige by informing us as soon as possible.

PERSONAL.

Mining and metallurgical engineers are invited to keep the ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Bradford H. Locke, of Denver, is visiting New York.

Mr. C. L. Wright, of Omaha, returned from London by the *Cedric*.

Mr. Karl Eilers has returned to New York from the Northwest.

Mr. W. E. Valy returned to New York recently from the city of Mexico.

Mr. R. W. Hollis, of Silverton, Colo., was in New York during the week.

Mr. John L. Toogood has left Ashanti to take up an appointment in Rhodesia.

Mr. E. M. Browder, of Oaxaca, Mex., was in New York recently on business.

Mr. James W. Malcolmson, of El Paso, is at Bisbee, Ariz., on professional work.

Mr. Arthur L. Pearse has returned to London from a professional trip to Siberia.

Mr. C. L. Wright sails on December 12 for Baraquilla, Colombia, on the *Altai*.

Mr. Edward Hooper, of London, is expected in New York on or about December 12.

Mr. S. J. Marks, of London, England, was in the city of Chihuahua, Mex., recently.

Mr. Leonard D. Sivyer, of Spokane, Wash., is at Globe, Ariz., on professional business.

Mr. L. A. Dunham, who is operating at Clifton, Ariz., is at the Waldorf, New York.

Mr. Sidney E. Malcolmson, of Butte, Mont., left recently for El Oro, Mex., to examine mines.

Mr. James F. Flynn, who has extensive mining interests at Parral, Mex., is now in New York.

Mr. Frank Gilpin, of Colorado Springs, has come to New York from Guanacive, in Durango, Mexico.

Mr. C. B. Armstrong, of Chicago, has been inspecting mining properties in the State of Oaxaca, Mexico.

Mr. H. W. Turner has changed his address from 320 Sansome street to 14 Sansome street, San Francisco.

Mr. George R. Buckman, representative of W. P. Bonbright & Co., at Colorado Springs, is in New York.

Mr. Arthur W. Pearce returned from Bolivia by the steamer *Seguranca* and proceeded to Denver on December 8.

Mr. Ernest G. Locke, from Oaxaca, Mex., will be in New York a couple of weeks. He is at the Hoffman House.

Mr. E. P. Arthur has been appointed superintendent of the Wilcox mine, in the Ymir district, British Columbia.

Mr. Ferdinand Deitzsch has been appointed consulting engineer for the Giant mine, Rossland, British Columbia.

Mr. R. Frank Pearce reached San Francisco from Singapore on December 2, and is now with his family at Denver.

Mr. J. Morgan Clements, formerly at Madison, Wis., has opened an office as mining geologist at 11 William street, New York.

Mr. Theodore E. Schwarz has been in Boston on the occasion of the death of his father. He has returned to Denver.

Mr. Titus Ulke has been appointed engineer in the division of Hydro-Economics of the United States Geological Survey.

Mr. Q. H. Thompson has been appointed general manager of the Wind Rack Coal & Coke Co., at Oliver Springs, Tennessee.

Mr. William B. Dennis, of Cottage Grove, Ore., manager of the Black Butte quicksilver mines, was in Spokane recently on business.

Mr. C. P. Crawford and Mr. M. U. Portwood, of Silver City, N. M., have gone to Durango, Mex., to examine mining properties.

Mr. A. I. Goodell has resigned as superintendent of the Montreal & Boston Copper Co.'s smelter at Boundary Falls, British Columbia.

Mr. Joseph H. Pratt has, we are glad to state, recovered from an attack of typhoid, and has left New York to go to North Carolina.

Mr. Samuel Storrow, of Los Angeles, Cal., is consulting engineer for a California syndicate that is promoting a hydraulic project.

The class of '83, Columbia School of Mines, will hold their twentieth anniversary dinner at Delmonico's on Tuesday evening, December 15.

Mr. Percy L. Fearn returned to New York from Idaho seriously ill, but is now recovering, we are glad to say. He is at the Buckingham.

Mr. A. H. Bromly has returned to London from an inspection of gold-bearing properties in Lapland, and expects to go to Mexico in a few weeks.

Mr. C. W. Pritchett returned to Denver from the San Juan country a few days ago, and left there for Mexico, to be absent about three months.

Mr. Morris M. Green, of Detroit, Mich., has been appointed professor of mechanical engineering in the University of Colorado, at Boulder, Colorado.

Mr. S. L. Pierce, president of the La Luz Gold Mining Co., of Chihuahua, Mex., has returned to his home, in Louisville, Ky., from El Paso, Texas.

Mr. George G. Blackwell, who has been visiting this country during the last three months, will return to Liverpool by the *Campania*, sailing on December 12.

Mr. J. O. Emanuel Trotz, of Worcester, Mass., has resigned as metallurgist of the United States Steel Corporation. Mr. Trotz has been in England recently.

Mr. Samuel A. Parnall has been appointed superintendent of the Calumet & Arizona Mining Co., succeeding Mr. I. L. Merrill, who retires on account of ill-health.

Mr. B. Magnus former superintendent of the refinery and silver mill of the Anaconda Co., is now associated with the Buffalo Smelting Works, of Buffalo, New York.

Mr. Chas. F. Sturtevant resigned December 1 as assistant smelter superintendent of the Montana Ore Purchasing Co., to assume charge of the Yampa plant, at Bingham, Utah.

Mr. Edward Hooper, formerly a partner in the firm of Bewick Moreing & Co., sailed from England on the *New York* to attend to professional business in the western States and Canada.

Mr. J. G. Pritchard, of Bisbee, Ariz., formerly librarian of the Copper Queen Co., and postmaster of Bisbee for 13 years, is interested in some gold mining properties near Bowie, Arizona.

Mr. Andrew Wheeler, Jr., of Philadelphia, has been appointed treasurer of the American Iron & Steel Association, succeeding his father, Andrew Wheeler, whose death is recorded elsewhere.

Mr. W. A. Kissam and Mr. W. H. Staver, president and assistant general manager, respectively, of the South American Development Co., returned from Zaruma, Ecuador, by the steamer *Allianca*.

Mr. H. A. Keller, mining engineer and metallurgist, of San Francisco, is looking after Mr. B. Guggenheim's mining interests at 52 William street, New York, in addition to his regular consulting work.

Mr. G. R. Bidwell has been elected president of the Mines Securities Corporation of New York, succeeding Mr. Thomas J. Hurley, who retires on account of partial blindness. Mr. Bidwell has left for Silverton, Colo., to inspect the company's property.

OBITUARY.

George S. King, founder of the Cambria Iron Works, now the Cambria Steel Co., died December 8 at Johnstown, Pa. He was in his 95th year. Mr. King was born at Hagerstown, Md. In 1833 he came to Johnstown, and at once became interested in the iron ore deposits there. Soon after in 1841, he interested local capital in a company for the manufacture of iron, and a furnace was built. From this small beginning the Cambria Iron Works resulted.

Mr. Siegmund Loewe was killed on November 25 in a motor-car accident near London, which occurred through his car endeavoring to clear an inexperienced cyclist. Mr. Loewe was one of the leading steel men in England, being the business genius of Vickers' Sons & Maxim. He was originally a director of the Maxim-Nordenfelt Co., and brought about the amalgamation of that company with Vickers, of Sheffield, and subsequently arranged the purchase by the amalgamated companies of the Barrow Shipbuilding Co. It was chiefly owing to his commanding business ability that Vickers' Sons & Maxim attained to the important and prosperous position it now occupies.

Andrew Wheeler died suddenly, from heart failure, at his residence in Philadelphia November 21. Mr. Wheeler had been the treasurer of the American Iron & Steel Association for more than 20 years, from August, 1883, to November, 1903. He succeeded in this office his older brother, Charles Wheeler, who had been the treasurer of the association from its organization, in 1864, until his death, in 1883.

Andrew Wheeler was born in Philadelphia on September 6, 1832. His father, Charles Wheeler, was a member of the Philadelphia bar, and his mother, Eliza Bowman-Wheeler, was a member of a well-known Pennsylvania family. After attending the old academic department of the University of Pennsylvania, Mr. Wheeler entered the office of Morris & Jones, iron merchants. He was admitted to a partnership in the business in 1860, when the firm name was changed to Morris, Wheeler & Co. His brother, Charles Wheeler, who had been a member of the firm of Morris, Tasker & Co., iron manufacturers, died in 1883, and two years later, when the latter company was incorporated, Andrew Wheeler became its president. He was also president of the Pottstown Iron Co. He was one of the directors of the Central National Bank from its beginning and a director of the Delaware Insurance Company.

Mr. Wheeler was long actively interested in the development of American shipping interests. He was a member of both the National and Philadelphia boards of trade, and in the former served many years as chairman of the committee on foreign and coastwise commerce. He was one of the early members of the Union League Club, having joined within a month of its organization. He leaves a widow and five sons.

SOCIETIES AND TECHNICAL SCHOOLS.

NEW YORK ACADEMY OF SCIENCES—SECTION OF GEOLOGY.—Prof. Herschel C. Parker, of Columbia University, will deliver a lecture entitled 'Explorations and First Ascents in the Canadian Rockies' on December 14 in the lecture-room of the American Museum of Natural History.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—The forty-eighth meeting was held in New York December 1 to 4. Mr. James M. Dodge, president, delivered the annual address, his subject being 'The Money Value of Technical Training.' Among the papers read were the following: 'Is Anything the Matter with Piece-work?' by Frank Richards; 'Suggestions for Shop Construction,' by F. A. Sheffler; 'Test of a Compound Engine, Using Superheated Steam,' by D. S. Jacobus; 'A Compact Gas Engine, Beam Type,' by C. H. Morgan. A number of electrical power houses were visited. The election of officers resulted as follows: President, Ambrose Swasey, of Cleveland, O.; vice-presidents, O. S. Jacobus, Hoboken, N. J.; M. L. Kolman, St. Louis, Mo.; A. Mattice, Pittsburg, Pa.; treasurer, William H. Wiley, of Orange, N. J.; secretary, Frederick R. Hutton, of Columbia University; council, George J. Rockwood, Worcester, Mass.; John W. Lieb, New York, and W. J. Keep, of Detroit, Mich. The spring meeting of 1904 will be held in Chicago.

INDUSTRIAL.

The American Locomotive Co. has opened offices in London at 26 Victoria street, Westminster, S. W.

The Pennsylvania Steel Co. is working on an order of 3,400 tons of 140-lb. steel rails for the Pennsylvania Railroad.

The General Electric Co. has been awarded the contracts for transformers aggregating 45,000 h. p. for the Necaxa, Mex., city power system of the Mexican Light & Power Co. The General Electric Co. has also a contract for the electric equipment of the Guanajuato Consolidated Mining & Milling Company.

The Westinghouse Electric & Manufacturing Co., of Pittsburg, has secured a contract for the equipment of the power station of the Metropolitan Railway Co., in London. The initial capacity of the plant will be about 15,000 h. p. There will be three turbines of 3,300 kw. each. Babcock & Wilcox boilers will be used.

A fifth stove is being added to the four stoves at the Searles furnace of the La Follette Coal, Iron & Railway Co., at La Follette, Tenn., which was built and put in operation about two years ago. The new stove,

which is 90 by 18 ft., together with appurtenant piping, connections and fittings, is being built by the William B. Pollock Co., Youngstown, O. H. M. La Follette is general manager of the Searles furnace.

The National Wood Pipe Co. has completed eight lines of 48 in. diameter, and one line of 18 in. diameter, of wood stave pipes, to be used as penstocks for the Columbia River Improvement Co., near Tacoma, Wash., the staves being made from Washington douglass fur. The same company is building two parallel lines of 36 in. diameter redwood stave pipes, to be used as penstocks for the American River Electric Co., near Placerville, California.

The Mediterranean Thomson-Houston Co., a part of the General Electric interests, has the contract for the hydraulic plant and its electric equipment at the base of Mt. Cenis, in Italy, to furnish power for the city of Turin. The initial capacity will be 4,200 kw. There will be three 12-pole turbines, driving three-phase alternators of 1,400 kw. each. The generating pressure will be 3,000 volts, with a line pressure of 30,000 volts. The high potential transmission will be 40 miles.

The American Steel & Wire Co. and the National Tube Co., branches of the United States Steel Corporation, exported more than 7,300 tons of wire, wire nails and pipe from eastern ports during November. The largest shipments of wire went to Australia; 1,357 tons, including cargoes of 673 tons and 609 tons. The total consignments sent abroad in November represented 3,104 tons, as against 6,826 tons for October, while 874 tons went to South America, Argentine ports having been forwarded 800 tons. South Africa received 35.4 tons and Europe 259 tons, 240 tons of which went to England. Christiania was the only Continental European port to which wire was sent last month. To China and Japan 162 tons were shipped; Cuba took 126 tons.

The Vulcan Iron Works, with offices at Wilkes-Barre, Pa., and shops at Wilkes-Barre, Pittston and Tamaqua, is doing some heavy work in its Tamaqua shops. It is building a pair of 42 by 60-in. first motion hoisting engines for the Lehigh Coal & Navigation Co.'s shaft at Lansford, Pa., and a 36 and 56 by 60 in. cross compound Corliss engine for the Lawrenceville Cement Co. This engine will have a 24-ft. flywheel with 11-ft. face that will drive two 5-ft. belts running in opposite directions. The shops, besides building heavy duty engines and air compressors, make rollers and bed plates for tube mills, as well as other cement works machinery. The company has recently filled, or is filling, contracts for cement machinery for the Pacific Portland Cement Co. of California and for plants in Michigan and at Tokyo, Japan.

At the annual meeting of the Association of Portland Cement Manufacturers in New York on December 8, a resolution was adopted that the members of the association should close their mills for six weeks or more between December 1, 1903, and April 1, 1904. Robert W. Lesley, of the American Co., retired as president and was succeeded by J. B. Loher of the Vulcanite Co. A. F. Gerstell, of the Alpha Co., formerly secretary, was elected vice-president: E. M. Young, of the Lehigh Co., formerly treasurer, was elected secretary, and E. R. Ackerman, of the Lawrence Co., became treasurer. The new executive committee consists of H. W. Maxwell, of the Atlas Co.; W. H. Harding, of the Bonneville Co.: R. W. Lesley, of the American Co.; W. R. Warren, of the Virginia Co.; George E. Bartol, of the Dexter Co.; E. N. Hagger, of the Illinois Co., and S. B. Newberry, of the Sandusky Co. The association at its dinner gave a silver loving cup to Mr. Lesley, the retiring president.

TRADE CATALOGUES.

The American Steam Superheater Co., of Boston, Mass., in an elegant catalogue describes the American superheater, pointing out the features of its construction and the value of superheated steam as an efficient economizer of fuel.

The American Manufacturing Co., of Los Angeles, Cal., in a vest pocket-size catalogue describes the centrifugal fuel oil burner, its action, points of advantage and other explanatory data, with the customary illustrations to give the uninitiated an idea of the burner itself.

The Buff & Buff Manufacturing Co., of Boston, Mass., has issued a catalogue of its engineering instruments, which is teeming with elegant half-tone engravings. Some little space is devoted to describing what the important parts of the engineer's transit should be, from a standpoint of material contained therein. The new planimetre is described in addition to the graduating machine, microtone, sextant, levels, etc. Prices are given for all parts, and much information regarding adjustment is imparted in condensed form.

SPECIAL CORRESPONDENCE.

Denver. Dec. 5.

(From Our Special Correspondent.)

The military now in the Cripple Creek district number nearly 650 men. The output for November for the first time since the strike began in the second week in August, was above the $1,000,000 mark, estimated at 41,000 tons of a gross bullion value of $1,251,000. Mr. E. Lyman White, commissioner of the Colorado State Bureau of Mines, who was sent by Governor Peabody to investigate the Vindicator explosion, spent several days at the mine in company with Mr. G. W. Snyder, one of his deputies. In a voluminous report to Governor Peabody, he concludes that the explosion was the result of a premeditated attempt to destroy that part of the mine.

On December 2 C. G. Kennison, Sherman Parker and W. F. Davis, all members of the executive committee of District Union No. 1, Western Federation of Miners, and Steven Adams, a union miner, were formally charged with the murder of Mr. McCormick, superintendent, and Mr. Beck, shift boss of the Vindicator. All four are held under heavy bonds in the Teller county jail. Other arrests were made of strikers as dangerous characters, engaged in inciting other dangerous and lawless characters to violence and commission of crimes.

Governor Peabody said on December 3, that the reign of the law-breaking element of the Western Federation of Miners has got to end in Colorado; though he did not criticize all the members of the organization as many were good citizens. He further said that he was surprised and shocked at the course of certain newspapers, which instead of denouncing the assassins and dynamiters and assisting the military in suppressing lawlessness, were giving aid and encouragement to lawlessness.

On December 4 the Governor issued a proclamation declaring that the civil authorities did not appear to be willing or able to maintain law and order in Teller county and proclaiming a state of insurrection and rebellion in the county. This proclamation is construed to mean that the same situation prevails in Cripple Creek as existed in the Coeur d'Alene district in Idaho when Federal troops were sent there to uphold the Governor in his suspension of the habeas corpus writs for the miners, who were later imprisoned at Wardner.

At Telluride, on November 30, 38 striking miners, mostly foreigners, were arrested by deputy sheriffs and the state militia charged with vagrancy. They were nearly all dismissed with a warning that they must either go to work, leave town or go to jail. The Western Federation of Miners advised these strikers to remain in Telluride. Some of them left the town, but others remained and were arrested and jailed. On December 3 they were put to work on the streets, under military guard, to work out their fines. Both the Tom Boy and Butterfly Terrible mines and mills are running at two-thirds capacity. Extensive preparations are being made at the Smuggler Union for beginning work. It is also expected that the Liberty Bell, Nellie Alta and other smaller mines will secure men and resume work as soon as the large properties have a full complement of men.

Some of the non-union employes of the Globe smelter, Denver, were recently attacked on their way to work by a mob. A number of arrests followed. The smelter continues to run at the same capacity. James B. Grant, of the executive committee of the American Smelting & Refining Co., said the company would run without the Western Federation of Miners as long as labor could be obtained and, if men could not be got, the plant would be shut down. Four of the six furnaces are running, and the remaining two would be busy but for the short coal supply. The strikers are almost entirely foreigners.

The coal miners' strike in the northern coal-field ended November 29, and most of the men resumed work the next day, insuring an ample supply of coal for the mining industry in the northern part of the State. The strike in the southern coal-field continues. John Mitchell, the president of the United Mine Workers, in a speech at Trinidad on December 3 showed a surprising lack of information as to local conditions, which, it was supposed, had been misrepresented to him when he authorized the strike. It is reported that the Colorado Fuel & Iron Co., and the Victor Fuel Co., the two largest operators in the southern field will supplement the men now at work by men from the East until the places of all the strikers are filled.

San Francisco. Dec. 2.

(From Our Special Correspondent.)

The Royal Consolidated mines at Hodson, Calaveras county, G. C. Kemp Van Ee, manager, have closed down owing to trouble with the miners' union. The Western Federation of Miners has made repeated attempts to form a union at Hodson, and at last succeeded. The company has never discriminated against union men in any way, but has always maintained that it would not recognize a union at Hodson. By the endeavors and promised financial aid of the union at Angels, a union was formed at Hodson, which demanded full recognition, and also the reinstatement of some miners who had been discharged. The company refused to reinstate the men, and a strike was ordered. While most of the employes walked out, quite a number remained at work, but as they were threatened with violence, the mine was finally closed down. At present writing the pump is drowned, men having been threatened who were operating it. This mine was a producer, and the mainstay of the town of Hodson. A large sum of money has been spent in developing it and putting in expensive machinery. Now 160 men are out of work and the mine is idle.

At the South Eureka mine, Amador county, underground work has been entirely suspended, the men having all quit work. The Sutter Miners' Union has declared the mine unfair and warned miners to keep away. The strike is due to refusal to reinstate discharged men.

The hydraulic mining community and the anti-debris men have a very strong interest in the fact that the barriers on the Yuba river at Daguerre Point were partly destroyed by freshets last week. The barriers injured were only about 3½ ft. high, and were intended to form a foundation for the subsequent rock-work which should form the dams. They were of brush; that is, fascines about 1 ft. in diameter, bound with wire, formed into cribs. It was expected that this brush-work would be undermined by the freshets and sink below the debris on which it was placed. Barrier No. 1, partly completed, has been badly injured; No. 2, which is 760 ft. long and a little over 3 ft. high, had been completed, and about 50 ft. are destroyed. This entire preliminary work was experimental, and was so pronounced in the reports of the engineers before construction began. Half the expense of the proposed dams devolves upon the State and the other half upon the Federal Government, and the work is in charge of officers of the United States Engineer Corps. There has been a great deal of discussion in the State as to the stability of brush dams for controlling mining debris. The dams are intended only to prevent the debris already in the river from coming further down into navigable water. All mines above the dams must still provide individual impounding basins for their own debris.

The State Supreme Court has handed down a decision in the famous "percolation" case, reaffirming its previous judgment and order. The case is a most important one for California, in many parts of which water is scarce and very valuable. As is the first decision, it was thought to apply to oil as well as to water. All the oil men in the State have been much exercised over the matter. The parties to the suit, Katz and Walkenshaw, owned artesian wells in San Bernardino county, where water is scarce. Walkenshaw dug an artesian well, which greatly reduced the flow in the Katz well, previously dug, the percolating supply being cut off. It was argued by the defendant that in common law the land-owner has the right to take whatever water he can from his property, and on this important point the court says: "Whenever it is found that, owing to the physical features and character of this State and the peculiarities of its climate, soil and productions, the application of a given common law rule tends constantly to cause injustice and wrong, rather than justice and right, then the fundamental principles of right and justice on which that law is founded, and which its administration is intended to promote, require that a different rule should be adopted —one which is calculated to secure persons in their property and possessions and to preserve for them the fruits of their labors and expenditures." The court comments on the steadily-increasing demand for water in parts of California and the economy now practiced in its use. It is suggested that the doctrine of reasonable use may afford some relief. The court adds: "In controversies between an appropriation for use on distant lands, and those who own land over the water-bearing strata, there may be two classes of such land-owners—those who have been using the water on their land, and those who have not used it, but claim a right to. Under the decision in this case, the rights of the first class of land-owners are paramount to those of one who takes the water to distant land; but the land-owners' right extends only to the quantity of water necessary for use on his own land, and the appropriator may take the surplus." According to this decision, the man with the deepest well and best apparatus cannot have all the water in the neighborhood, especially to carry it off and sell it elsewhere, even if he does operate on his own real estate. The court asserts that there is no necessary parallel between oil and water percolations and the question as relating to oil need not be decided at this time. The oil men were afraid that the first decision admitted of the first person in an oil field practically controlling the whole flow beneath the surface.

Spokane. Dec. 2.

(From Our Special Correspondent.)

Mr. Jay P. Graves, general manager of the Granby Consolidated Mining, Smelting & Power Co., operating mines at Phoenix, B. C., and a smelter at Grand Forks, B. C., announced this week that the corporation will pay its first dividend of $133,500 on December 16. It is at the rate of 1% on the issued capital, and it is expected that similar dividends will be declared quarterly. Mr. Graves announces that if, after six months' run, the company satisfies itself that the supply of fuel and labor is permanent, the Granby will set about the construction of a duplicate smelter with a capacity of 2,100 tons.

A wholesale conspiracy to rob the Northport, Wash., smelter of $40,000 worth of sow and furnace bottoms has been disclosed at the trial of A. L. Peel, former shift-boss in the furnace-room of the Le Roi's smelter there. He was arrested while trying to get away with 250 lb. of rich sows. The trial is now under way at Colville, Stevens county, Wash. George W. Bartlett, a real estate man of Northport, who joined in the conspiracy against the smelter company, has turned State's evidence. According to a mutual understanding, says Bartlett, Peel commenced stealing the product and delivering it to Bartlett's house. The product was worth $30 a pound, as it carried the rich gold and silver residue of the furnaces. By January 15 last, according to Bartlett, they had accumulated 250 lb., or, say, $7,500 worth of the metal. Bartlett and Peel packed the stuff in a trunk, and Bartlett tried to take it with him to Oakland, Cal., but the agent at the railway station refused to accept the trunk as baggage because of its weight. Bartlett took the trunk home, pretending that there were a lot of books in it that he did not need on the trip, and he would reduce the weight by taking them out. Then he and Peel divided the weight by packing the slag in a trunk and a chest. Bartlett testified that he and a policeman of Northport, John Kanaley, stood in on the deal and were building houses, which they rented to immoral women on expectation of getting money from their robberies. Kanaley, who was also on the stand, testified that he was in partnership with Bartlett on some building and saloon propositions, and that he knew Bartlett was in the matte-stealing business. The trial is still on. It promises to involve others in the smelter town, and it is impossible to tell what the company lost in stolen sows, although it is evident that the plot was nipped long before the conspirators had gotten away with the $40,000, which they set as their ideal.

The management of the Republic Consolidated Gold Mining Co. has decided to turn over all the corporation's property to Secretary W. G. Lanskill for the benefit of the creditors, who have claims amounting to $200,000. It is not believed that anything of serious value can be saved to the stockholders from the wreck. The stock, which sold at $1 four years ago, with a capital of $3,500,000, is begging at about 5c. The reorganization committee, recently appointed to see about floating bonds with which to carry on development, in hope of finding new ore-bodies, advised against further expenditure. The Republic Power & Cyaniding Co., an allied concern owning the Republic mill, recently turned over its property to an assignee. It is in debt from $200,000 to $300,000.

Toronto, Can. Dec. 5.

(From Our Special Correspondent.)

Great excitement is reported at Sault Ste. Marie over supposed extensive gold discoveries at Webbwood and the return of a party of local prospectors, who have examined the country around the Shakespeare mine. It is now claimed that this vein has been traced for a distance of three or four miles, and ranges from 40 to 60 ft. in width. Several companies have been found to operate claims that have been laid out. The statement that a general exodus of prospectors to the new gold fields has set in is regarded as highly improbable by the officials of the Provincial Bureau of Mines, as there is a foot of snow in the district, rendering prospecting operations well-nigh impossible.

A company is being organized to operate on corundum mines in Raglan township, Renfrew county, in which a number of American capitalists are interested. The company, which will be known as the Corundum Refiners, Ltd., has applied for a patent for 600 acres of land, on which it proposes to erect a corundum reduction plant. The incorporators will include W. B. Rankin, of the Niagara Falls Power Co.; Edward Michael, of Buffalo, N. Y.; James A. Roberts, of New York; J. N. Scatchord, Charles R. Huntley, and J. C. Conway, of Buffalo; H. P. Cobourn and John H. Tilden, Hamilton, Ont.; and J. H. Jewell and Hartley H. Dewart, of Toronto, Canada.

P. Kirkegaard, manager for the Canadian Gold-fields Co., will be manager at the mines and superintend the construction of the plant, which it is hoped to have in full operation by July, 1905. This will be the third corundum company operating in Ontario.

The Damascus Gold Mining Co., capital $250,000, has secured a provincial charter of incorporation. The provisional directors are James S. Lowell, William Bain, Robert Gowans, Ernest W. McNeill, and Richard Richardson.

The Shakespere Gold Mining Co. has been incorporated with a capital of $2,000,000. The provisional directors are William E. Seelye, William Word, Frank Carey Bolin, Rudolph J. Hartley, John N. Nevers and Andrew Gowan, all of Brainerd, Minn., and James Miller, of Sault Ste. Marie, Ont. The company has secured the Shakespere mining property at New Webbwood, the original owner of which was Thomas W. Trotter, of Sault Ste. Marie, who got a title to it as a copper location. It was subsequently purchased by James Miller for $2,000

Victoria, B. C. Dec. 1.

(From Our Special Correspondent.)

The report on the Eva group, submitted to shareholders at the annual meeting held in Nelson last week, states that 746 ft. of underground work was performed during the year, the average cost of tunneling being $11.45 per ft. and of raising $7.38 per ft. The company has installed an aerial tramway and a 10-stamp mill, crushing having been started on October 4, the returns from the initial run of 439 hours being: Crushed 705 tons ore, 3.38 tons per stamp every 24 hours; recovery, 305.5 oz. bullion, valued at $5,533, and 4½ tons of concentrates, valued at $100, representing an average recovery of about $8 per ton, and an extraction of 87% of the assay values. On November 17 an important strike was made in No. 7 tunnel, 12 in. of free-milling ore having been encountered in the face.

Mr. Garde, manager of the Payne mine, at Sandon, informs me that the new zinc plant recently completed at that property is working successfully, the grade of the zinc having been raised from 42 or 43 to 57 or 58%, while a very desirable product for the smelter is being made. The system followed at the Payne is briefly this: The 42% product is charged, after it has been concentrated by the wet process, into a combination drying and roasting furnace, whereby the spathic iron (siderite) associated with the zinc is changed into a magnetic product. After cooling, the roasted ore is sized in vibrating screens, and passed over a Knowles magnetic separating machine, the iron being thus retained, leaving the zinc as a fine product. The arrangement of the plant is automatic, and the cost of handling is consequently reduced to a minimum. The plant has been in operation for three weeks. There are at present 1,300 to 1,500 tons of zinc ore awaiting treatment at the mill, besides a considerable tonnage at the mine.

At Camp McKinney the Cariboo mine, which, I am informed, has recently been running at a loss, has been closed down. The ore proves to be no longer free-milling.

Boundary.—The Granby Co. has ordered two locomotive engines to be used in hauling ore from Nos. 1 and 2 tunnels. All six furnaces at the smelter are in blast. The new additions to the plant include two furnaces of standard type, supplied by the Allis-Chalmers Co.; three Connelsville blowers, a 25-h. p. motor for operating the automatic furnace-charging apparatus and additional Westinghouse transformers. A second payment has been made under the Volcanic bond, a large low-grade copper property near Grand Forks. Negotiations are in progress for the sale of the Nellie Cotton group, at Phoenix. It is announced that the sale of the Volcanic mine, a large, low-grade deposit, on the North Fork of Kettle river, has been consummated.

Rossland.—The October returns of the Le Roi again show an estimated loss. The directors are considering the desirability of installing a 400-ton Elmore mill. The White Bear Co. has meanwhile ordered a mill of this type, which is to be built immediately.

San Luis Potosi. Dec. 1.

(From Our Special Correspondent.)

In the camps of El Oro and Tlalpujahua there has been nothing of special interest for several weeks, though small strikes have been variously reported from the Noche Buena, the Old Abe, and the Santiago y Anexas, and the latter will have a 100-stamp mill. At La Maria mine, near Morelia, Michoacan, worked by a company very recently organized by Julius Ambrosius, an excellent showing is being made, report having it that the clean-ups amount to $25,000 in gold a week, and the cyanide mill is fast approaching completion.

In Nuevo Leon the Maiz brothers are contemplating building a smelter at Bustamente. At the San Salvador, near Monterey, owned by Emeterio de la Garza, a bonanza has been opened up. An aerial tramway is being put in by Van Voohis & Sanford, at $16,000, gold, and will soon be finished. It will connect the mines with Leona station, of the National railroad. The output will then be raised to about 100 tons a day, or more than doubled. At Topo Chico, out to the southwest from Monterey, electric drills for quarrying and modern machinery for dressing have been installed at the marble quarries.

It is stated that by the first of the year J. B. Haggin and associates will have started on the erection of a smelting plant near the city of Chihuahua to cost $3,000,000, Mexican. At Santa Rosalia, the Allis-Chalmers Co. is now building a 50-ton matte furnace and a 50-ton lead plant for the Encinillas Mining Co., which, it is expected, will be blown in before the end of the year. Las Vigas, near Coyame, is developing into a good copper property, and the Señorita, near Victorina, owned in Boston, is showing an excellent vein of gold and silver on which cyanide tests are being made with a plant in view. G. W. Allen and associates, of Denver, are developing a copper property near Casas Grande, in northern Chihuahua. The old property of El Japonesa, after a varied career and numerous failures, has been taken up again by Chicago people, who believe it worth another trial.

Down on the Isthmus of Tehuantepec an English company has taken up the iron properties of F. H. Woodhouse, made the first payment of $20,000, gold, and is getting things in readiness to ship by way of Coatzacoalcos, as soon as the improvements at that port are completed.

Following the cessation of the rainy season work has begun anew in Oaxaca and especially in the Ejutla district, and first of the new companies organized to work in that district is one with $500,000, gold, capital, led by A. J. Peyton, of New York, and Lionel H. Miller, of Mexico City, known as the Doña Carmen Mining Co., which will work the Carmen, Porvenir and Providencia claims. The Soledad, near Ejutla, which has only three *pertinencias*, but excellent gold values, has been sold by Manuel Bustamante to R. T. Gleimore and associates of Chicago, for $30,000, gold; it is their intention to proceed at once to put in a $20,000 concentration plant. Chicago people also have C. K. Robinson examining gold properties in the Ayoquesco district, near the properties on which S. McPherson is making fine showings. Other American capital is investigating La Luz, on the extension of La Maria, in the San José district. Near Oaxaca the Juanita group is to be worked by a company of the same name, with G. M. Houston as president.

London. Nov. 30.

(From Our Special Correspondent.)

Considerable attention is being paid at present to a recently discovered gold-field in Lapland. I do not mean that Lapland is to be the subject of a boom on the stock exchange. Lapland is within Russian dominions, and the Russian authorities nip stock exchange booms in the bud. The activity is really an extension of the interest taken in mining in Sweden and Norway during recent years. Both iron and copper now occupy the attention of Scandinavian capitalists, and operations are conducted on most modern and scientific lines. The Lapland deposits have been opened up by people in Helsingfors. German and English firms have also examined them and lent financial aid. The formation is an unusual one geologically, and further study is required before definite opinions can be given. The gold occurs in veins of massive carbonate of iron mixed with quartz, that are extruded through granite. The gold is equally distributed in the quartz and iron. There is no trace of copper at the depth so far attained, which is only about 200 ft., but pyrite begins to come in, and the opinion of some engineers who have inspected the properties is that chalcopyrite may be found farther down. I hope to obtain further detailed information about this unusual deposit from an English engineer, who has recently returned from an inspection.

The report of the Transvaal Labor Commission has been published. It confines itself strictly to statistics and other information relating to the supply of unskilled labor and the demand for it on farms, mines, and railways, and does not attempt to give any conclusions or propositions for the amelioration of present conditions. It is simply a collection of facts to help those in authority in their deliberations on future policy. It appears that agriculture and railroad work are hampered nearly as much as mining. For the construction of new railways, some 40,000 natives are required, but only 3,000 are obtainable. Mining only has 60,000, though three times that number are wanted. It is not quite clear from the report whether the stated requirements include only those now wanted for works in progress and plants ready for operation, or whether any allowance is made for the development of the country on the increased scale that was expected on the conclusion of the war; but, apparently, it is only present requirements that are referred to. As regards the difficulty in securing native labor, the report shows that the mining industry suffers more from the present shortage than the other occupations now offered to the native, but chiefly from the native now living on the surplus of the high

wages paid to him by the military authorities during the war. A prominent South African mining man gave me his opinion the other day, that we have always over-estimated the population as regard native able-bodied men. He believes that the native population is not anywhere near the estimated figures, and that the scarcity of laborers is not due so much to their reluctance to undertake mining work, as to their non-existence. Whatever the cause of the shortage, the report leaves the alternative fairly obvious—the importation of Asiatic or Indian labor. The report having thus far cleared the air, there is much more buoyancy in the mining market, and the stagnation has disappeared for a time. I would point out, however, that the importation of Asiatic or Indian labor has yet to be tried in practice. No one knows yet if such labor can be obtained under the terms and conditions which local sentiment in South Africa will render obligatory. The problem of obtaining such labor may be just as difficult as that of securing native labor, so that the future of the mining industry is by no means solved as yet.

Johannesburg. Nov. 1.

(From Our Special Correspondent.)

The drought, which was beginning to cause uneasiness in mining circles, is at last over, copious rains having fallen. Some of the dams were approaching the danger point, and, had the dry, hot days continued much longer, several of the mills would have closed down. With the exception of a heavy shower more than a month ago, there was no rain from April 29 to October 16. One realizes that it is somewhat precarious to rely on the rainfall stored in dams, for the water supply of such an industry as this. Should a very protracted drought overtake us, as occasionally happens in this country, mines would be compelled to close down. The importance of the water problem is such that a government commission was appointed over two years ago to investigate the question of water supply, but nothing has yet resulted from the investigations. Two suggestions were, to rely on the Vaal river for a large part of the water, and also to bore wells in the extensive dolomite formations to the west. Some mines on the Rand are better situated, as far as water is concerned, than others. The water sheds in the Central Rand, for instance, are very much better than the sheds in the Eastern Rand, where the country is more level.

On account of the high price of water, every effort is made on the mines for its conservation. All the mine-water runs into the surface resources. Storm trenches and ditches are dug to collect as much of the rainfall as possible, and divert it to the dams. All the water from the mills is caught and pumped back to be used over again. Towards the end of the rainy season (the end of April) the large dams of the different groups are usually full.

The Rand Central Ore Reduction Co., an old concern, went into liquidation the other day. The failure of the only ore reduction company in the Transvaal of any importance is the greatest testimony I know of to the comparative simplicity of the Rand metallurgical processes. With the same number of gold mines in Australia or America, it is probable that several such companies would be required to treat complex ores, by-products, etc. At the present time every gold mine on the Rand can easily recover its gold from all sources. There are no by-products for sale; therefore, there is no room for ore reduction works. In the early days this reduction company was prosperous. In June, 1895, a dividend of 25% was paid on a capital of £120,000, while in June, 1898, 10% only was paid on a capital of £154,000. The company's operations consisted of smelting and refining, slimes and tailings works, lead-rolling works, and the erection of cyanide and slimes plants and smelting furnaces. Several of the cyanide plants were erected by the Rand Central Ore Reduction Co. When the Siemens & Halske electrical precipitation process was abandoned in 1898 the company sustained a severe blow. Most of the mines sold their lead bullion from the slimes plant to the reduction company; also the numerous by-products from that process. The margin of profit made by the company was considerable. Things have changed now. The zinc method of precipitation is almost universally employed; most mines have adopted Tavener's lead-smelting process and erected furnaces of their own, in which all by-products can be successfully dealt with.

The Rand Central Co. made good profits by treating slimes from several mines. In the early days the slimes were twice as rich as they are at present. Gradually, slimes plants were erected on different mines to deal with this material direct from the mills. The Reduction Co. has been treating accumulated slimes of late, but the results were not over brilliant.

The proposal was made that Eckstein & Co. take over the plant of the Rand Central Ore Reduction Co. and run it as a central plant for the different mines of this group. It is doubtful whether the proposal will be accepted. The Tavener process can be made to work so well and so cheaply that it is improbable that the mine manager would like to see the auriferous material from the cyanide works taken off the property to be treated. The saving in cost per ounce of fine gold by treating it at a central plant would not amount to much. It is highly probable that the works of this company will be closed down.

T. LANE CARTER.

Perth, W. A. Oct. 26.

(From Our Special Correspondent.)

Kalgoorlie.—Development work on the Great Boulder continues to open up well, and the ore reserves are being steadily increased. The center of interest here just now is in the developments on the Associated and Associated Northern blocks; the former company has just cut into a body of ore at the 1,000-ft. level valued at 2.5 oz. per ton, thus confirming the body of ore previously penetrated by a bore-hole.

The Associated Northern is still doing work at the 1,050-ft. level.

The Oroya-Brownhill has its 50 stamps now in full work. Ore reserves are here also very much increased on the Oroya North block. The ore-shoot has been proved to be 30 ft. wide at the ninth level.

The Lake View Consols management has had some trouble lately by the old trick of 'salting' battery samples, and a new scheme for preventing these has been devised. Frequent cases of ore-stealing continue to be found, the rich telluride ores being so valuable that thieves run all sorts of risks in spite of the drastic police regulations.

There is a good deal of difference of opinion as to the course of the celebrated Horseshoe-Boulder Boundary lode, which, I reported some time ago, was found to run into Boulder ground at the 1,000-ft. level. The Horseshoe people say that the lode is still in their ground, but the theory that it split into two rich formations is most probably correct.

The following are the details of the outputs of the principal mines for September:

	Tons.	Oz.
Golden Horseshoe	13,079	17,603
Boulder Perseverance	11,208	14,325
Great Boulder	9,008	14,291
Great Fingall	8,337	*11,233
Ivanhoe	12,364	*11,076
Oroya-Brownhill	3,834	*6,907
Associated	4,673	6,760
Cosmopolitan	7,678	*5,344
Sons of Gwalia	7,824	*5,246
Lake View Consols	7,851	*4,246

*Fine gold.

Developments at the north end of Kalgoorlie continue very promising. The Devon Consols struck a further rich patch, yielding 233 oz. of gold. The specimens are very fine. Several leases at this part of the field are to be re-opened, and the diamond drill is to be extensively employed.

Murchison Gold-fields.—The Great Fingall is looking very well; the new manager, W. W. Pomeroy, has arrived.

The Black Range district is going ahead; though experts visiting this part are not much impressed with the alluvial. Great opinions are expressed as to quartz veins. Australian capital is being invested.

The Wirramina lease has been taken over by an Adelaide group. The reef is 10 to 12 ft. wide and shows gold.

At Mount Magnet matters are looking well, many miners getting good returns. The State public battery system is doing excellent work in many districts, and assisting prospectors and many lease-holders to develop their holdings satisfactorily.

Auckland, N. Z. Oct. 31.

(From Our Special Correspondent.)

Bunker's Hill.—The history of this Coromandel Co. well illustrates the ups and downs of gold mining in New Zealand. Some seven or eight years ago, when the neighboring Hauraki mine was obtaining extremely rich ore, close to their boundary from a lode known as Legge's Reef, which was striking directly into the Bunker's Hill ground, shares stood at a high figure, it being anticipated, of course, that the Hauraki ore-shoot would continue into the latter property, and there be picked up. Vigorous search, however, failed to reveal the existence of payable ore, and the usual hypothetical "fault" was called upon to explain its absence. Though during 1900 some £1,888 worth of gold was won in another part of the mine from a fairly rich patch, the prospects of the mine less than 12 months ago appeared quite hopeless, and the company was about to go into liquidation. At this juncture, an offer to work part of the mine on tribute was made by a party of local miners, two of whom had formerly worked in the Hauraki. After some discussion, for it was more than suspected that the prospective tributers had some special knowledge, a two-months' tribute was let. The tributers, working from the Hauraki, obtained specimen stone during their first shaft, and during the period of their tribute gold to the value of £3,306. During the following six or seven months the company obtained gold to the value of £7,024 from the same run of specimen ore. This has enabled it to pay off its debts, to declare a substantial dividend, and at the close of the financial year to carry forward a fair balance. Strangely enough, the lode now being so successfully worked, was encountered in a cross-cut so far back as 1897, but as here it was merely a clay seam with no appearance of quartz, and giving no dish prospects, it was considered unworthy of future tests. The moral would seem to be that, in patchy mines at any rate, all lode formations intersected by cross-cuts, even if valueless where struck, should be further prospected by driving along their strike, for some little distance at all events.

GENERAL MINING NEWS.

ALABAMA.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

An explosion of powder in the Flat Top mines of the Sloss-Sheffield Steel & Iron Co. last week caused the death of two men and the serious injury of eight others. One of the dead men was T. S. Massey, State mine foreman; one of the seriously injured men is W. L. Rogers, the State superintendent of mines. The powder was ignited by an employe of the Sloss-Sheffield Steel & Iron Co., whose duties were to parcel out powder to convicts. He was killed also.

ARIZONA.

COCHISE COUNTY.

Tombstone Consolidated Mines Co.—The two pumps are nearing completion on the 700-ft. level and expected to be ready by January 1. They have 9¼-in. plungers, with a capacity of 2,500,000 gal., and will force the water to the surface.

GRAHAM COUNTY.

(From Our Special Correspondent.)

A. F. Hoffman & Co.—A 10-stamp mill is being erected on this company's group, near Marenci. There is a 3-ft. vein at the bottom of a 40-ft. shaft.

Sierra de Oro Gold Mining Co.—The cross-cut tunnel now being run by this company, near Clifton, is in about 1,350 ft., and has cut a blind vein of gold-bearing quartz about 3 ft. wide, assaying $25 gold, 2% copper, and 9% lead. Delbert M. Potter and Ben. M. Crawford, of Clifton, are in charge.

Stevens.—These mines, at Metcalf, have a new smelter in operation. The gasoline hoist proved unsatisfactory and a steam one has been substituted.

MARICOPA COUNTY.

Home Run.—The new machinery for the mill at this mine is being placed and expected to be in operation very soon. The shaft is down close to 500 ft.

(From Our Special Correspondent.)

Azula.—This new gold mine, in Pilgrim district, has a 2-ft. body of high-grade ore. There are nine claims in the group.

De La Fountaine.—This mine, at Stockton hill, has a new gasoline hoist in operation. The mine will ship four car-loads of ore a month.

Elkhart.—Work has been resumed on this mine at Chloride, closed since June 30. The mine has been taken over by a new company, and the 600-ft. shaft is to be sunk 400 ft. deeper.

Gold Road.—This mine, at Acme, is shipping an average of $12,000 in gold weekly. The cyanide and crushing plants have a capacity of 200 tons daily.

Great West.—This mine, in Weaver district, will have its cyanide and crushing plants, 200 tons capacity, in operation shortly.

Keystone.—A new 100-ton mill is being installed at this mine in Mineral Park. Three new gasoline motor hoists are in operation.

PINAL COUNTY.

(From Our Special Correspondent.)

Gila Monster.—A good force of men is at work on this mine at Kelvin. G. Emmett is manager.

Superior.—Men at this mine at Florence have struck for higher wages. The company refuses the advance demanded.

Troy Manhattan Co.—This company will build a smelter at Riverside, on the Gila river.

CALIFORNIA.

AMADOR COUNTY.

Kennedy Mining Co.—At this property, Jackson, Webb Smith superintendent, men are at work putting additional stamps to the mill. The foundation work is completed and roofs being put on.

South Eureka.—Underground work is entirely suspended on this mine, at Sutter creek, John Truscott superintendent, owing to a strike of the miners.

Zeila Mining Co.—At this property, at Jackson, W. F. Detert manager, the mill is running full capacity.

and 5 tons of sulphurets daily are concentrated. The chlorination works having only 4 tons daily capacity, quite a surplus has gathered.

BUTTE COUNTY.

Steifer Mining Co.—The shaft in this mine, near Magailia, has nearly reached bedrock. It is a drift proposition.

CALAVERAS COUNTY.

El Rio.—At this mine, formerly the Shepard, at Mountain Ranch, the new mill is crushing more gravel than was expected.

Kenross.—This mine, at Jesus Maria, has been closed down awaiting the return of Manager J. T. Thompson from the East.

Stockton Hill Gravel Co.—Some rich gravel has been struck in this property. The old works have been explored and found that little breasting had been done.

Salvator Mining Co.—At this mine, at Jesus Maria, the shaft is down 800 ft. on the slope of the vein. An 8-stamp water-power mill is in use.

Utica Mining Co.—Many repairs have been made at this mine, Angels, L. W. Shinn superintendent, during the shut-down, and the property is ready for a winter run.

Welsh.—This mine, at Copperopolis, closed down for some time for lack of water, is again running.

EL DORADO COUNTY.

Alexander.—A lot of machinery has been received at this mine, Omo Ranch, and the mill will shortly start.

Whim.—At this mine, Omo Ranch, the tunnel is in 360 ft. and very near the ledge.

KERN COUNTY.

The coal mines at Garlock are to be prospected by diamond drills.

Confidence.—This mine, adjoining the Rand, shows up a body of good grade ore on the 100-ft. level.

Friday Gulch Mining Co.—This company, at Havilah, H. L. Meacham superintendent, has its machinery almost ready for work. Final payment on the property was recently made.

St. John.—This old mine, at Sageland, at the foot of Piute mountain, is having a cyanide plant put in.

NEVADA COUNTY.

Frank Hall has purchased several more claims on Shady creek, near Cherokee, on the San Juan ridge, including the Brophy claim. The plant is run by a Pelton wheel and the centrifugal pump raises the gravel effectively. Another pump is to be put in. Charles L. Miller is superintendent.

Blue Tent.—The new mill at this mine, Blue Tent, Clifford Graham superintendent, will be ready to crush in about two weeks.

Central Consolidated.—At this mine, Oscar Coflin superintendent, rich ore is being taken from the Duval claim, one of the three ledges in the property.

Gaston Ridge Mines Co.—Several mines in Washington district have been acquired by this company, composed mainly of the following men: J. J. Meyers, A. Maltman, B. Goodwin, Hugh Humphreys, C. Christensen, E. B. Grissel and W. H. Mead.

Gold Point.—A rich gold strike has been made in this mine, near Grass Valley.

North Star.—Work which has been going on since 1898 has just been completed at this mine, the 1,600-ft. raise from the bottom of the Central shaft having made connection with the old incline. The incline is now 4,000 ft. below the apex. A. D. Foote is manager.

Numitor Gold Mining Co.—This company, at Chicago Park, is to increase the capital stock from $200,000 to $2,000,000.

Phelps Hill Development Co.—This company is to build a dam in the cañon below Phelps hill as soon as permission can be obtained from the California Debris Commission.

PLUMAS COUNTY.

Continental.—It is the intention of the company owning this mine, near Johnsville, F. W. McLean manager, to build a storage reservoir, ditches, etc., and fully equip for working by hydraulic process.

Golden Star.—This property, near Nelson Point, has been sold by Kelley & Borden to Minneapolis men, and reduction works are to be put up. Meantime, extensive development work has commenced.

RIVERSIDE COUNTY.

Fano-Kunzite-Tourmaline Mining Co.—This company, operating on Coahuila mountain, is about to drift into the mountain in search of lithia, kunzite and tourmaline. The Little Blue claim appears thus far to have the best variety of gems. There is wood and water at the claims.

SAN BERNARDINO COUNTY.

Brooklyn.—This company, at Dale, has put in a 30-ton leaching plant, copper in the ore making this necessary.

Ivanhoe.—This company, J. J. Ellerman superintendent, at Dale, has 25 men at work building a new road, and a 30-ton cyanide plant will be put up.

John Suter Gold Mining Co.—This company has been organized to work a group of 10 claims near the Bagdad mines, Bagdad. The directors are John Suter, president; A. L. Selig, vice-president; E. E. Selph, secretary; T. L. Martin, D. C. Sullivan and Andrew and J. A. Henderson.

O. K. Mining Co.—This company, at Dale. Joseph Ingersoll superintendent, has started up its new 30-ton cyanide plant.

Supply Mining Co.—The new cyanide plant at this mine, Dale, has been completed. Two new ore shoots have been found in the mines.

Virginia Dale.—This property, at Dale, has been sold to a Mr. Sigafuss for $25,000 cash.

SAN LUIS OBISPO COUNTY.

Polar Star Quicksilver Mining Co.—This mine, near San Simeon, has been incorporated, with the following directors: H. H. Carpenter, P. A. Arata, W. F. Little, R. A. Minor and E. S. Rigdon.

SANTA CLARA COUNTY.

Ochre.—A body of this mineral paint has been found on the ranch of O. N. Nelson; 14 miles northwest of Gilroy.

Santa Teresa.—This company, near Edenvale, has resumed operations, and 60 men are now at work. The property is owned by Boston men.

SHASTA COUNTY.

Copper Queen.—This property, in Pit river district, is being worked under bond by B. F. Rogers for eastern men. About 350 ft. of tunnel have recently been driven.

SISKIYOU COUNTY.

Ock.—A large lot of iron pipe is being hauled to this old hydraulic claim at Happy camp. This is one of the most extensive hydraulic claims in the country.

Sulphur Springs Mining Co.—This company, at Elk creek, has equipped its mine with machinery, and surveying for a new ditch is now in progress. This is an old gravel channel.

TRINITY COUNTY.

Enterprise.—Second payment has been made on this group, in East Fork district. Mark Manley is manager and made the payment for George R. Wooding & Co., of Boston.

YUBA COUNTY.

New Blue Point.—The owners of this property, at Smartsville, have recently been studying conditions, which may be favorable to starting it up. The Anti-Debris Association refused to allow it started as a hydraulic mine.

COLORADO.

CHAFFEE COUNTY.

Cache Creek Placers.—These placers, at Granite, have closed for the season. It is estimated that the company took out over $60,000 in gold from March 1 to November 1. The winter will be employed in building flumes, ditches and making other improvements, piping to higher ground and building new boarding houses. The property is owned by an English syndicate, and all the gold taken out is shipped direct to England. The placer embraces several thousands of acres, not quite half of which has been sluiced.

Saguache Hydraulic Placer Mining Co.—At this property, near the mouth of Twin Lakes creek, considerable machinery has arrived, consisting of a 45-h. p. dynamo, an 80-h. p. Pelton water wheel, several elevators, each equipped with an electric motor powerful enough to hoist a man and a car of gravel 15 or 20 ft.

CLEAR CREEK COUNTY.

Consolidated Gem.—The upraise, which is being run from the lateral in the Newhouse tunnel to connect with the upper workings of the Gem, will be completed, it is expected, not later than January, when, instead of hoisting the mineral to the surface, it will be handled through the upraise and the Newhouse tunnel into the immense ore bins at the mouth of the tunnel and transported from there by cars to the mills of the company, the Newton and State Ore. The latter mill is being reconstructed and will have a capacity of at least 100 tons a day. An 800-ton concentrating plant is contemplated, to be built at the mouth of the Newhouse tunnel next year.

Memphis & Idaho Springs Gold Mining Co.—This company is to erect a large compressor plant, to be used in extending the Tropic tunnel through its property. The company's claims include all the ground between the Gem and Sun & Moon.

Mica Gold Mining & Milling Co.—This company has a tunnel in 175 ft., and has contracted for 200 ft. more. A large mica dyke is expected to be cut.

Speck.—This mill, at Dumont, has resumed operations after an idleness of several years. The mill has passed into the hands of J. T. Michaels and Charles Anderson, who are owners of the Eagle mine, on Albro mountain, a mile and a half from the mill. There is a wire tramway to the property, but it is in poor condition, and a train of 20 jacks is being used to take coal up to the property and bring the ore down.

Sylvania Gold Mines Corporation.—On the Mona mine of this company, on Bellevue mountain, about 14 leasers are at work. A 4-in. streak opened is said to average $70 a ton.

FREMONT COUNTY.

First Colorado.—A steam drill is at work on this property. A shipment of 15 sacks of dolomite ore has been made. The ore runs well in gold, silver and lead.

Humboldt & Pocahontas.—These two properties, at Rosita, have passed into the hands of a New York syndicate, headed by Frank Fruend. Operations will begin at an early date, and new machinery installed. The old plant at the Humboldt will be overhauled and refitted.

Preston Gold Mining Co.—This company, near Florence, has resumed operations, and is sinking its Bismuth shaft, showing good lead carbonates.

Stratton Gold Mining Co.—A contract for a 30-ft. shaft has been let by this company, near Florence.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Coal Situation.—Now that the coal strike in the northern coal-fields seems to be settled, a number of mines which were compelled to suspend operations and economize on their coal supplies are resuming operations, and in another week the usual number of men will be employed again.

Belden.—William Couch, of Central City, has been placed in charge as manager of this property in Chase gulch to succeed the late B. J. Smith. Samuel Newhouse and eastern capitalists are interested, and development is in force in the 615 ft. levels.

Bertha Mining & Milling Co.—Dr. J. T. McClanahan, president and general manager of this company, has secured deeds to additional property from Patrick Mackey under option for some time. The company has been handicapped for some time on account of conflicts between the interests of numerous stockholders, and an effort is being made to get the tangled affairs of the company in shape for a resumption during the coming year.

Fairfield Gold Mining Co.—The November production was 58 cords and 30 tons of smelting ores. The mill dirt will average 3 oz. gold to the cord, while the smelting ores average from $75 to $100 to the ton. Baltimore parties are interested in a lease and bond, with Dr. W. M. Nickerson, of Central City, as manager.

Four-Mile Gulch Mining Co.—Sinking operations are being kept up at the Democrat mine of this company. The shaft has been sunk to 350 ft., disclosing a good streak of mineral assaying 1.46 oz. gold and 127.5 oz. silver. John Brohl, of Central City, Colo., is manager.

German.—Russian Gulch parties have formed a pool to operate this gold property in Virginia cañon under a lease. E. S. Fouts, of Russell Gulch, Colo., is manager.

Gilpin Mines Development Co.—Denver parties have organized this company and taken a lease and bond on the Diedrick property, in Illinois-Central district. They have erected a small shaft building and installed a 12-h. p. gasoline engine of Fairbanks, Morse & Co. make. The shaft is down about 130 ft., and H. E. Corn, of Central City, Colo., is manager.

Nemeha.—A lease and bond has been taken on this property, on Bobtail hill, by Colorado parties, with George H. MacGregor as superintendent. A gasoline hoisting plant has been installed, and active developments are to be carried out. The shaft is over 400 ft. deep, and the property is credited with producing very rich ores, both milling and smelting.

November Ore Shipments.—During the past month the shipments of smelting and crude ores, mill tailings and concentrates from the Black Hawk depot to the Denver smelters and outside points of treatment were 199 cars, or 3,980 tons. This was not up to the average, because a number of properties were obliged to curtail production on account of the shortage of coal.

Old Town Mining Co.—Sinking continues with air drills, and the shaft is down over 1,300 ft., showing about 4 ft. of mineral. The 11th and 12th levels are being opened up with air drills and showing good ores. About 50 men are employed on company and leasing account. George K. Kimball, Jr., of Idaho Springs, Colo., is manager.

Two-Forty.—The Twolon Mining Co., in which Boston capital is interested, has resumed sinking operations, and 100 ft. will make the shaft about 300 ft. deep. A force of men is working in the lower and upper tunnel levels taking out considerable smelting product, carrying very fair values. S. Hoskin, Centrai City, Colo., is manager.

Ute.—This mine, on Quartz hill, is showing a smelting streak 12 in. wide in the 200-ft. level running over $100 a ton. The property is being worked under lease with J. C. Chappell, Nevadaville, Colo., in charge.

GUNNISON COUNTY.

Brunswick.—This company, in the Tin Cup district, is driving the Blistered Horn tunnel into West Gold hill to cut the Jimmy Mack vein at 1,000 ft. or more. The tunnel is in over 700 ft., and encountered 10 to 12 ft. of mineral at 650 ft. between the porphyry and granite. Assays run from $1 to $35 in silver, 5 to 10% lead, and some gold.

Citizen.—This property, in the Mineral Farm basin, near Gunnison, is shipping eight tons a day of $50 to $60 ore. The main shaft is to be sunk 275 ft. and another level run on the vein. When this is done, if it demonstrates the continuity of the vein, a tunnel of 4,000 ft. will be driven from Quartz creek to cut the vein at 1,000 ft. depth.

Jimmy Mack.—The ore in this mine is greatly improved, and much has been shipped. A milling plant, costing $125,000, has been erected at the foot of the hill on West Willow creek to treat the low-grade product. The enterprise is backed by wealthy eastern people.

Tin Cup.—This mine, in which a rich body of silver ore was opened recently, is shipping regularly. The ore is very high grade, running in car-load lots $1,500 or more. The property is owned by Thos. H. Mastin, Jr., and J. M. Malang, of Kansas City.

Woods Gold Mining Co.—This company recently encountered a 5-ft. vein of ore on its Pieplant mountain property, which assays from $8 to $300 a ton. The company has completed its 40-ton mill, and next spring will have it running on the ore.

LAS ANIMAS COUNTY.

A party of strike breakers while traveling toward Primero, a Colorado Fuel Co. camp near Trinidad, on December 7, were attacked by striking Italian miners and forced to flee. Later, deputies who were guarding the coke ovens of the company met the attacking party and in a fight killed one Italian, fatally wounding another and severely wounding three.

SAN JUAN COUNTY.

Robert Bonner.—W. D. Colo has six men working on this group in Lookout mountain. Over 2,000 ft. of levels have been driven and considerable rich ore, it is said, was produced.

Trilby Gold Tunnel Co.—This company, owning 12 claims in Royal Tiger basin and on King Solomon mountain, is driving a long cross-cut, now in 400 ft. Another contract has been let to drive 400 ft. additional. Supplies for the winter are being packed to the mines.

SUMMIT COUNTY.

Iron Mask.—D. M. Masters, of Denver, has a lease and bond on this property, near Kokomo, which is producing much iron-sulphide ore, and another shift, it is said, is to be put on shortly.

Jessie.—This property, in Gold Run, it is reported, has been leased to T. R. Griffith and others for three years. The property is equipped with rapid-drop, 40-stamp mill and 10 Wilfley concentrating tables. The mine is opened up by a number of tunnels, ranging from 1,100 to 3,500 ft. in length. Alex. Mathieson will be placed in charge.

Laurium.—The tunnel on this property, near Breckenridge, is in about 1,000 ft., and progressing slowly, owing to the hard formation encountered.

Monte Christo.—A body of lead sulphide 6 to 8 ft. thick is reported opened. Work continues on the mill and buildings. The new mill site renders an aerial tramway unnecessary.

Novelty.—This property, on Nigger hill, near Breckenridge, is operated by Lovage & Detwiler, and the new shaft is said to show a concentrating iron-lead-silver-gold ore.

Silver Queen.—This tunnel is in 300 ft., and is to be extended 3,000 ft. with an air compressor plant. It is expected to cut the Canola, Great Eastern, Scotia and Sunnyside veins, at the head of Picayune gulch, near Silverton.

Snowbird.—This group, in Hematite basin, Tower mountain, owned by Terry & Stroble, has about 1,000 ft. of work completed. A 6-ft. vein is opened, and a mill is to be erected on a site on the Animas river, running a 4,000-ft. tram to the mine.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Elkton.—These properties, including lessees, are employing from 160 to 175 men. The company's own workings, owing to water conditions, are employing one day shift. The output for November has been the heaviest of any month since a year ago.

Ida May.—Waddleton & Payne have a lease on block 6 of this ground, and have a good showing on the Raven dike at about 20 ft.

Lois.—This cyanide mill, owned by the Sioux Falls & Cripple Creek Mining & Milling Co., is on the south slope of Copper mountain, and treats the ore from the Flourine and Ft. Wilcox ground. The mill has a tank capacity of 85 tons every 24 hours, and will crush 150 tons in the same time. The first clean-up December 1, showed a saving of 85% on fine assay values. The ore is mined in an open quarry and conveyed to the mill, 965 ft. down the mountain, by a gravity tram. At the mill the ore is automatically dumped into a large bin leading to the Austin gyratory crusher. Before reaching the crusher the fine is run through a grizzly, which goes directly to the rolls' elevator. The rock, after passing, drops to the rolls' elevator and is elevated 20 ft. to a Wild shaking screen, the finished product passind directly to the pulp-bin elevator, then to the leaching tanks. The large sized ores from the screen drop directly into the McFarlane rolls, and from them back to first elevator and carried over the screen again, the entire process requiring four days. The cost of mining is 30c. per ton, and of milling 65c. per ton. The average value of the ore as mined approximates $6.40 per ton. The consumption of cyanide is .25% per ton of ore. There are six men employed in mining, two on the tram and seven in the mill day shift and a 4 o'clock shift on the machinery.

Mary Ann.—N. K. Trout & Co. have a lease on the north block of the Mary Ann, Ravenhill, and are getting a good showing at a depth of 120 ft.

Morning Star.—Sharpe & Wyatt, leasing on this claim, will resume work again after a shut-down of a few days. Their production before closing was from 70 to 108 tons per week. While following a small vein, they broke into a chimney, some 25 ft. in diameter, composed of large boulders incrusted with jasper, and also a mixture of gray copper, carrying high values. On the 400-ft. level they encountered some lead ore carrying good values.

New Haven.—This property, on Raven hill, has been closed for some time, but opened December 4, with a new leasing company and S. A. Stafford manager.

IDAHO.

ADA COUNTY.

(*From Our Special Correspondent.*)

Hidden Treasure Placer Mining Co.—Lee Bunch, owner of the Big Bend placers on the Payette river, 12 miles from Graden valley, has formed this company to expose 2½ miles of placer ground in the Big Bend of the Payette by driving an 800-ft. tunnel across the neck of the bend, through which the water will be diverted.

SHOSHONE COUNTY.

(*From Our Special Correspondent.*)

New Jersey.—It is reported that modifications of the New Jersey mill, recently installed, have not enabled the company to make satisfactory extraction. The management has been considering the installation of the Hendryx process.

ILLINOIS.

(*From Our Special Correspondent.*)

On Wednesday, December 2, at Springfield, the board of arbitration appointed to decide what advance in wages the coal hoisting engineers of Illinois should receive for the year beginning November 1, 1903, rendered its decision, giving an advance of $10 per month for all classes and grades. The board was composed of two coal operators and two coal hoisting engineers, with Thomas S. Kidd, of Chicago, vice-president of the American Federation of Labor, as umpire. At the joint convention in Peoria early in October the engineers demanded an advance of $20 per month for all classes and grades of engineers, and the operators offered 12½% advance. The convention adjourned without an agreement, and late in the month another convention was held in Chicago at the request of the engineers, at which they modified their demand to $15 per month advance, which the operators met by offering $10 per month advance as their ultimatum. This offer was referred to the engineers throughout the State for a referendum vote, and was rejected. Then H. N. Taylor, of Chicago, acting for the operators, offered to leave the matter to arbitration, the offer being promptly accepted, with the result as stated.

MACON COUNTY.

(*From Our Special Correspondent.*)

The Manufacturers' association of Decatur has sunk a shaft at that place and is putting up top works. Shaker screens and first-motion 20 by 36-in. hoisting engines are to be installed. The No. 5 coal vein, 4.5 ft. thick at that place, is being mined.

Flint Mica Co.—This company, a Michigan corporation, has purchased the Poll Miller mica mine, near Burmington, and is installing an extensive electric plant. A small dam gives a head of 100 ft. and an impact wheel develops 50 h. p. Box-drills will be used.

SANGAMON COUNTY.

(*From Our Special Correspondent.*)

Barclay Coal & Mining Co.—The Central Coal & Coke Co., of Chicago, and the West End Coal Co., of Springfield, Ill., have bought out the Barclay Coal & Mining Co., at Barclay, Ill., George N. Black, of Springfield, president. The property consists of a small mine producing about 400 tons per day, about 600 acres of coal right, 50 acres of surface, 50 miners' houses and a company store. The price paid was $100,000. The plant will still be operated under the name of the Barclay Coal & Mining Company.

Springfield & Chicago Coal Co.—This company, of Springfield, Harry Devereux president, is equipping its mine with shaker screens, 20 by 36 in. first motion hoisting engines and Halbert self-dumping cages. The tipple is now under construction.

INDIANA.

GREENE COUNTY.

(*From Our Special Correspondent.*)

Pennsylvania-Indiana Coal Co.—This company, with $500,000 capital stock, has bought for $100,000 a tract of land in this county and let the contract for mining equipment.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(*From Our Special Correspondent.*)

Atlantic.—The November product of this mine was 345 tons 805 lb. of mineral, an increase of 17 tons over October.

Baltic.—This mine produced 622 tons of mineral in November, and 720 tons in October.

Calumet & Hecla.—Work has been started on another exploration shaft to open the Kearsarge amygdaloid lode on the northeastern portion of this company's lands. The new shaft is 1,500 ft. south of the first shaft. A diamond drill was recently secured, and exploratory work was in progress several weeks before the drop shaft was started.

Champion.—The product of this mine in November was 773 tons of mineral, an increase of 39 tons over October.

Franklin.—This mine's production in November was 374 tons of mineral.

Old Colony.—A copper-bearing lode has been penetrated in the cross-cut west from No. 1 shaft at a depth of 580 ft. It was first opened by a diamond drill two years ago. It is an amygdaloid and has been drifted upon for 50 ft., showing copper for much of that distance.

Quincy.—The production of this mine in November was 1,157 tons of mineral, an increase of 147 tons over the previous month's yield.

Trimountain.—This mine's product in November was 511 tons of mineral.

Wolverine.—This mine produced 510 tons of mineral in November.

COPPER—KEWEENAW COUNTY.

(*From Our Special Correspondent.*)

Ahmeek.—Work on the mile extension of the Mineral Range railroad to this mine is completed and in commission. The equipment purchased from the Meadow Mining Co. will be installed at once. Both shafts are sinking steadily and the showing continues good.

Miskwabik.—Sinking in the northernmost exploratory shaft has reached a depth of 50 ft. It will be continued to the 100-ft. level. A cross-cut will then be extended south 300 ft. to the strike line of the permanent shaft and an upraise holed through to surface. Thirty men are employed under Capt. Thomas Rapson.

Mohawk.—This mine produced 362 tons of mineral in November. Opening work is progressing steadily, 30 power drills are in commission, and rock shipments average 1,000 tons daily. The third head is nearly completed and should begin stamping rock in a short time.

Phoenix Consolidated.—Rock shipments are from the stockpiles and the West vein shaft. The rock is returning a good percentage of copper. Six narrow-gauge rock cars have been purchased from the Mineral Range Railroad Company.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

Adventure Consolidated.—The output of this mine in November was 95 tons, it is estimated.

Mass Consolidated.—The production of this mine in November was 125 tons of refined copper. Shaft C will not begin producing rock until next spring, as the Mineral Range railroad was not extended to that point as planned. The force at shaft C has been cut 25 men. Very little development work is planned this winter.

IRON—MARQUETTE RANGE.

Cleveland-Cliffs.—This mine, at Ishpeming, is to be equipped with a new power station. Fuel will be fed by mechanical stokers. The hoist will be a Sullivan, with 7-ft. drums, driven by a 20 by 42 Corliss engine. A 50-drill Nordberg compressor will be installed. The new 400-ft. vertical shaft, close by the station, will be topped by a steel head frame.

Gibson.—The Oliver Mining Co. has ceased operations permanently on this property at Amasa and removed its machinery. The mine was surrendered to the owner, T. J. Gibson, from whom the option was obtained four years ago. Ore was met with frequently, and some fair-sized pockets were cut, but they proved to be bunchy and not centralized enough to make a paying mine.

Hemlock.—This property, at Amasa, has increased its underground force and will operate through the season, stocking much ore.

Republic.—This mine has cleaned up its stockpile, and no more shipments will be made this winter.

MONTANA.

The State Senate on December 8 passed both the change of venue bill and the measure providing for a review of the facts in equity cases by the Supreme Court. These are the two measures whose passage was sought by the Amalgamated Copper Co. Under their terms it will be possible for the Amalgamated to secure hearings in the many cases with F. A. Heinze before district judges other than those at Butte.

GALLATIN COUNTY.

(*From Our Special Correspondent.*)

Montana Corundum Co.—J. J. Farrell, of Butte, is in charge of the concentrating plant and mines of this company, near Salesville.

Northwestern Improvement Co.—The coal washer just completed at Chestnut for this company, costing $80,000, is a total loss from a fire. H. J. Horn, manager, who has control of the coal interests of the Northern Pacific Railway, which operates its coal properties under the above-named company, has taken steps to rebuild.

GRANITE COUNTY.

(*From Our Special Correspondent.*)

Tiger.—The case involving the apex question between this property and the Nancy Hanks at Garnet is to be tried at Philipsburg. T. F. Ward is asking judgment for $50,000, claiming ore to that value has been extracted by Richie and associates of the Nancy Hanks from the Tiger vein.

JEFFERSON COUNTY.

A good strike is reported on the iron properties of James J. Hill and Senator Paris Gibson, three miles from Wicks, on Clancy creek. They own 20 patented claims, mostly iron properties. A tunnel has been run 400 ft., and a vein 20 ft. wide struck carrying gold, silver, copper and iron. About 13 ft. is of high-grade smelting ore. In the spring a concentrator will be placed on the property.

LEWIS & CLARKE COUNTY.

(*From Our Special Correspondent.*)

Bald Butte.—Considerable exploratory work is going forward at this property at Bald Butte. The 40-stamp mill has not been in commission for some months. The company for some years seemed more anxious to see monthly dividends than explore for new ore shoots. The result is no ore is at present available for the mill.

Empire.—The cyanide mill, built to work the large amount of tailings, has not been very successful the past season. Considerable changing of machinery has been made, consuming much time.

Hubbard.—The mill at this property is in operation. Owen Byrnes, of Gould, is manager.

North Star.—A strike of 14 ft. of gold ore has been made in this property at Marysville. The property is next to the Drumlummon, owned by the Montana Mining Co., Ltd., and is owned by Thomas Cruse.

Piegan.—Work on the new tunnel of this mine, three miles from Marysville, is progressing with two shifts. This will tap the ledge about 400 ft. down with a tunnel length of 1,200 feet.

West Belmont.—J. H. Longmaid and brothers are working this property, and using the Belmont cyanide plant, near Marysville.

MADISON COUNTY.

(*From Our Special Correspondent.*)

Garnet Mining Co.—The new power plant of this company, at Pony, has been installed. It comprises a 3-ft. Pelton wheel, operated under 100 ft. pressure: a Webber 5-h. p. gasoline engine, a 6-h. p. dynamo, and a 30-in. blower with 8-in. run-around for blast or suction. The building is 12 by 28 ft. The wheel or engine will run three Durkee electric drills; one is now in use. E. L. Ballou is manager.

Little Kid.—E. A. Wetmore, of Helena, and associates have an option on this property, near the head of Meadow creek. The property has two mills, a 10-stamp mill run by water-power and an old Bryan milling plant, which has seen considerable service.

Madison Cañon Power Co.—The material for the new dam across the Madison river, eight miles below Ennis, is being hauled on the ground. The dam will be of timber structure, and 4,000 h. p. will be available from this plant, which will be made use of by mining companies in the vicinity of Virginia City.

MISSOULA COUNTY.

(*From Our Special Correspondent.*)

Boston-Colby Mining Co.—The tunnel on this property, near Saltese, is in 500 ft., where a station will be cut and a winze sunk. Andrew Flaig is in charge. Some stringers of good ore have been cut in the tunnel.

PARK COUNTY.

(*From Our Special Correspondent.*)

Cokedale.—Coal is being hoisted at this coal camp; the coke ovens are ready to be charged, and 100 miners are working. A branch of the United Mine Workers of America has been formed with a membership of eighty-seven.

SILVER BOW COUNTY.

(*From Our Special Correspondent.*)

Colusa Parrot Smelting Co.—The first of the new blister copper furnaces at the reduction works of this company is in operation. Two more furnaces are under construction. These are being built under the supervision of the company's constructing engineer, James Doul. At the company mines, the equipment now being installed will, when finished, equal any in the camp. Nordberg hoists, duplicates 32 by 72 in., will be at the Original and West Stewart mines. Steel head-frames are in place. At the Original preparations are being made to place two Ingersoll-Sargent compressors, each capable of handling 50 air drills. These are to be operated by two 500-h. p. General Electric induction motors using rope transmission. The motors will take the power from the Missouri River Power Co.

NEVADA.

NYE COUNTY.

(*From Our Special Correspondent.*)

Goldfield.—The exodus from Tonopah to this new camp continues, and a town is rapidly springing up. The Blue Bull group of nine claims has been bonded for $100,000 to J. P. Sweeny and Josiah Winchester, of Cripple Creek, Colo., $5,000 to be paid down and the balance within one year.

NORTH CAROLINA.

JACKSON COUNTY.

Carolina Development & Realty Co.—This company, of Asheville, has recently opened the old McCulloch mine, near Greensboro. John Lord, the manager, has a force of miners at work there.

Empire Talc & Kaolin Co.—This company will soon install a plant for grinding and refining talc at its mine, at Beta, near Dellsoboro. The company has offices in Jersey City, N. J.

ROWAN COUNTY.

(*From Our Special Correspondent.*)

Gold Hill.—These copper mines are in the hands of a receiver, who has filed against the company over $200,000, for money advanced, salaries and machinery supplies. W. G. Newman is president.

Union.—This copper property has developed copper ore at the 700-ft. level. The problem of treatment for the ores is the only cause that the mine is not a paying one.

Whitney.—The McMacken ore of this company is yielding $24 per ton, while that from the rich strike at the Barringer mine is being melted in crucibles. The low grade is yielding $10 on the plates.

OREGON.

BAKER COUNTY.

Alamo.—The mill on this property, near Sumpter, is completed, and the flume supplying the water power is almost finished. The stamps will be dropping in less than two weeks.

Gold Pan.—A 10-stamp mill and a 1,000-ft. hoist have been ordered from the Holthoff Machinery Co. The stamps each weigh 1,000 lb. The mortars are to be for rapid crushing. No concentrating tables will be put in at present. The power plant will consist of a 100-h. p. Scotch marine boiler and a 50-h. p. Corliss engine, with a Cameron sinking and a station pump.

Golden Wizard.—Machinery for a 12-stamp mill, rapid-drop, quadruple discharge, has been ordered to be erected at once on this property, near Sumpter. In addition, the plant will be equipped with five table concentrators.

Last Chance.—The machinery for the hoist is in place, and the plant in full operation. Sinking has been resumed on the ledge.

Man of War.—An 8-ft. ledge of free-milling ore has just been opened in the lower workings on this claim, near Greenhorn. The mine is the property of the Rockefeller Mining Company.

Storm King.—This company, located near Sumpter, is running two tunnels, one on the Honest Dollar and one on the Storm King.

LANE COUNTY.

Black Butte.—The smelter at this quicksilver property, near Cottage Grove, is being enlarged from 60 to 100 tons capacity, it is reported, and the development work aggregates between 14,000 and 15,000 ft. In the 1,000-ft. shaft a crosscut was run every 100 ft. This shows the ledge to be 80 ft. wide. There are said to be 150,000 tons of ore on the dump. W. B. Dennis, of Cottage Grove, is manager.

PENNSYLVANIA.

ANTHRACITE COAL.

Lehigh Coal & Navigation Co.—This company, at Seek, Schuylkill county, is sinking two 1,000 ft. shafts, one for water and one for hoisting coal. Both are at breaker No. 10.

Silver Brook.—J. S. Wentz & Co., operators of this colliery, at Silver Brook, Schuylkill county, are to open old No. 5 slope. A pump is being installed to pump out the workings. The pumping will take about two months.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Columbia.—Perry Bertchey and Dennis Henault, owners of this group, have recently discovered the valuable ore bodies on the ground, one large vein giving returns from $16 to $49 per ton in gold.

Copper Butte Mining Co.—This company has a solid vein of pyrite 40 ft. wide, and is testing it.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Deadwood-Standard Gold Mining Co.—The company has opened its ore bodies under cover. The plant will be enlarged in the spring from 125 to 250 tons, daily capacity.

Golden Empire Mining Co.—Three shafts are being equipped with sinking machinery to prospect on a large scale.

Hidden Fortune Gold Mining Co.—In the new mill 40 out of the 60 stamps are dropping, and the other 20 will be started in about a week.

PENNINGTON COUNTY.

(*From Our Special Correspondent.*)

Central Black Hills Copper Co.—The lixiviation plant, 12 miles from Hill City, is ready to run. Drake Barnes & Co., of Cleveland, are the principal owners. H. H. Francis, of Custer, has had charge of development work, which has disclosed a large quantity of copper ore claimed to average 3%.

UTAH.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Ore Shipments.—During the week ending November 27 136 cars were shipped as follows: Bullion-Beck, 4; Carisa, 12; Centennial-Eureka, 31; Eagle and Blue Bell, 2; Gemini, 8; Grand Central, 23; Lower Mammoth, 14; Martha Washington, 1; May Day, 1; Swansea, 3; South Swansea, 6; Tetro, 4; United Sunbeam, 1; Victor Consolidated, 2; Yankee Consolidated, 3; Black Jack, 1; Dragon, 20.

For the week ending December 4, shipments were 156 car-loads, as follows: Ajax, 1; Bullion-Beck, 8; Carisa, 14; Centennial-Eureka, 53; Eagle & Blue Bell, 1; Gemini, 6; Grand Central, 29; Joe Bowers, 1; La Clede, 1; Lower Mammoth, 12; May Day, 1; Star Consolidated, 1; Swansea, 4; South Swansea, 5; Tetro, 2; Dragon Iron, 17.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Bingham Consolidated Smelter.—Shipments of copper bullion for the week ending December 4, amounted to three cars, 181,235 lb.

United States Smelter.—Copper bullion shipments for the week ending December 4 amounted to 181,000 lb.

Utah Consolidated Smelter.—Shipments of copper bullion for the week ending December 4 were four cars, 300,945 lb.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

Comstock.—Cross-cutting has been started from the 450-ft. level.

Daly-Judge.—The ore body containing high values on the 1,400 ft. level, encountered several weeks ago, continues to show improvement. The same vein has been encountered on the 1,200-ft. level. The mill is treating about 300 tons per day. The concentrates net better than $35 per ton, while the crude ore shipments have netted a little better than $25 to the ton. From 600 to 700 tons of crude ores are sent out daily.

Ontario.—This new plant is rapidly advancing towards completion. It will be 60 days before it is ready for commission.

Silver King Consolidated.—The new hoisting plant is in commission. The shaft is nearing the 700-ft. point.

West Ontario.—H. C. Shimp, of the Rickey-Shimp Co., of Colorado Springs, has closed a deal for this Park City property, of 137 acres. The purchase has been made in the interest of the Diamond-Nimrod Co. It is planned to consolidate the two, making a group of 170 acres.

WASHINGTON.

FERRY COUNTY.

Belcher.—Six to ten men are kept at work on this property, near Republic camp. More than 1,700 ft. of tunnel is said to be driven, and a new gasoline engine and fan were recently installed. D. F. Anderson is general manager.

OKANOGAN COUNTY.

(*From Our Special Correspondent.*)

Pinnacle.—The strike of bonanza gold ore in this mine, on Palmer mountain, near Loomis, in the upper levels, is apparently a chimney 10 ft. long and 8 ft. wide, 300 ft. from the mouth of the adit. The Pinnacle Gold Mines Co., a Seattle corporation, is considering the erection of a 40-stamp mill, and has completed a tram 1,500 ft. long. A tunnel has been started 150 ft. below the old one. It is showing the vein about 8 ft. wide, and values are reported to be $20. A recent test of 1,000 tons of ore from the upper dump at the Black Bear mill went $20 on the plates and $1.85 in the tailings, with a nominal volume of concentrates.

SNOHOMISH COUNTY.

Bunker Hill Mining & Smelting Co.—This company, near Index, recently received half of a duplex 12-drill Ingersoll compressor and a 10-ft. Pelton wheel. Underground work will be resumed when these are in operation.

Corona.—A body of chloride ore, 3 ft. wide, is reported in this mine, in the Silver creek district, 14 miles from Index.

Sunset.—A good strike is reported in this mine, near Index. The ore body is said to be 17 ft. wide and to carry copper, gold and silver.

STEVENS COUNTY.

Iron Hill.—This prospect is awaiting a diamond drill to push exploration.

THURSTON COUNTY.

Great Western Coal & Development Co.—This company, with coal mines about 16 miles from Olympia, has done about 6,000 ft. of work, including drifting and shafts. About 30 men are employed, and the mine has an output of about 200 tons per day. A washing plant has been installed at a cost of $5,000. The company has a lease on its holdings, 25,000 acres, for 42 years. In a depth of 240 ft. three veins have been discovered from 4 to 11 ft. wide. The officers are: H. G. Lougee, president; Richard Naylor, vice-president; N. C. Hunter, secretary and treasurer.

WEST VIRGINIA.

RANDOLPH COUNTY.

Davis Colliery Co.—This company, of Elkins, capitalized at $3,000,000, is making extensive improvements at its mines, near Junior, including construction of a new railway, etc., and will absorb properties on the line of the new Coal & Coke Railway. The properties are said to include the Washington Coal & Coke Co., 60,000 acres; Braxton Coal Co., 35,000 acres; Empire Coal & Coke Co., 11,000 acres; Mill Creek Coal & Lumber Co., 10,000 acres, making a total, with original holdings, of 138,000 acres. The company has about completed 300 coke ovens, a new tipple with capacity of 500 tons a day, and a steel bin for storage of 1,500 tons of slack coal at Coalton. Henry G. Davis is president.

WISCONSIN.

BARABOO DISTRICT.

Illinois.—This mine, at North Freedom, owned by the Deering Harvester Co., has closed down, and the pumps will be pulled. It was the only producer in the district, and about 300 men were employed under Joseph Sellwood.

WYOMING.

CARBON COUNTY.

North American Copper Co.—The smelting and converting plant at Grand Encampment has resumed work. The smelter will make an indefinite run.

Ferris-Haggerty.—This mine, at Grand Encampment, has closed down for the winter, throwing 150 men out of employment. About 25 men are to be kept at work enlarging the tunnel. The smelter at this place and the tramway line will be closed down also, and the tramway rebuilt. A compressed air locomotive has been ordered, and the new electric light plant is completed.

Elk Mountain.—The shaft on this property is down 190 ft., and is said to be in high-grade copper ore and bornite. Considerable water has been encountered.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending November 21 shipments were as follows: Granby, 11,666; Mother Lode, 2,976; Snowshoe, 1,740; Emma, 840; Sunset, 270; Oro Denoro, 792; Athelstan, 390; Winnipeg, 90; totals for week, 18,764 tons; year to date, 585,189 tons.

For the week ending November 28 shipments were: Granby mines, 10,831 tons; Mother Lode, 3,168; Snowshoe, 1,650; Sunset, 330; Emma, 627; Oro Denoro, 792; Athelstan, 270; total for week 17,688 tons; year to date, 600,589 tons. The Granby smelter treated 10,981 tons, or a total of 312,460 tons so far this year.

BRITISH COLUMBIA—CARIBOO DISTRICT.

Nettie L.—This mine has closed down on receipt of orders from London, letting out 30 men. The company desires to hold all shipments until the completion of the combination 20-stamp silver mill, being constructed jointly by the Nettie L. Co. and the Silver Cup Co. It will probably be three to four months before work resumes. Some 90 men are employed on the construction of the mill.

Silver Cup.—This mine is being opened up systematically and employing 50 men.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—For the week ending November 28 shipments were as follows: Le Roi, 4,740 tons; Centre Star, 1,380; War Eagle, 1,140; Le Roi No. 2, 290; Le Roi No. 2 (milled), 350; Jumbo, 120; Kootenay, 240; total, 8,260 tons; total for year to date, 367,140 tons.

I. X. L.—P. H. Craven has taken a lease on this mine, at Rossland.

NOVA SCOTIA—CAPE BRETON.

Dominion Coal Co.—The output of this company's mines for November was 268,435 tons, a decrease of 28,831 tons from October.

MEXICO.

CHIHUAHUA.

(*From an Occasional Correspondent.*)

Messrs. Carey & Underwood are on the way overland from Chihuahua to take charge of the Lluvio de Oro. Mr. McKay expects to devote his time to opening the old Bahuirachic copper mine.

Las Tajas Development Co.—This company is opening a gold mine near Morelos, and has also secured a bond and is working Los Platinos copper mine, near Choix, which caved in nearly two years ago. Before the cave, the mine had been worked successfully for two years, having produced shipping ore valued at about $300,000, Mexican.

San Geronimo Placer.—These placer mines, on Los Novillos creek, in the western part of Chihuahua, in the Morelos district, have been opened this summer. The pay dirt comes largely from Sonador branch, which heads up in the Sarupa mesa. There is but little fall to the creek, and there is only water enough for a 12-in. sluice. The stones are picked out by hand, and only the gravel shoveled into the sluice-boxes, from the end of which the tailings have to be shoveled away. The pay-channel, so far as tested, is from 10 to 25 ft. wide, the depth to bed-rock being about 5 ft. About one-half is stripped off, leaving about 2.5 ft. of pay gravel. Only a small amount of gravel is handled in a day. The average yield is about $3 per yard, the production being about 0.25 oz. per man per day. The gold is coarse and easily saved, but the clean-up is hard to make, owing to the excessive amount of black sand and small particles of baryte. Labor has been very scarce this summer, and much of the time the two owners have worked alone, so that the yield thus far has been only about 60 oz. gold.

SINALOA.

(*From an Occasional Correspondent.*)

The high bench placers on the Fuerte river are attracting considerable attention this season. A Texas company has installed a pumping plant at Santa Polonia bar, and is about to begin washing. Three more plants are on the way, which are to be installed, respectively, on Mesa Colorado, Mesa Saltillo and Sapucha. These plants are each equipped with rotary pumps, having a capacity to raise 1,000 gal. per minute to an elevation of 140 ft. These pumps will be driven by gasoline engines.

NEW ZEALAND.

Exports of gold and silver from New Zealand for September and the nine months ending September 30, are reported by the Mines Department as follows, in ounces:

	Gold.		Silver.	
	1902.	1903.	1902.	1903.
September	57,783	58,542	61,037	67,553
Nine months	372,847	401,190	431,910	656,604

The greater part of the silver has been obtained from the mines at Ohinemuri, in the Hauraki mining district. For the nine months the increase in gold was 28,343 oz.; in silver, 224,694 oz. The gold bullion exported this year was equal to 360,297 oz. fine gold, or $7,447,338 in value.

MINING STOCKS.

(Full quotations are given on pages 914 and 915.)

New York, Dec. 9.

Evidently, the "enlightenment" of the copper shareholder by means of large-sized advertisements in the daily press, and by systematic circularizing—the "bait" of a prominent Boston operator—has had some effect on the stock market. On Monday of this week Amalgamated, the pivot on which the other coppers seem to move, rose nearly five points to $46.375 on sales of 161,750 shares, and on Tuesday advanced to $47.375, but later declined to $45. Anaconda gained also, rising to $20, which is $2.875 better than last Thursday. Tennessee on curb went to $30. Greene Consolidated, of Mexico, has been the target of the bears, who, acting on rumors of internal dissension and attempt to oust a leading official, hammered the stock to $10.875, and on December 3 nearly 25,000 shares were reported sold up to $12.75. Of course, these adverse reports have been officially denied, but there is no gainsaying that Greene shares have suffered from extreme speculation. On December 8 5,700 shares changed hands up to $14. White Knob, of Idaho, made larger sales at $10@$9.75, while British Columbia is up to $4.

In the gold and silver list there is evidence of better trading, but prices still hover around low marks, principally because operators persist in taking profits whenever the market recovers. Ontario silver, of Utah, came forward at $6. El Paso, of Cripple Creek, Colo., sold at 50c., and Isabella has gone down to 75c., while Portland sold 400 shares at $1.10, and Elkton, 60, at 42@43c. The Comstocks are again burdened with assessments—just to end the year as it was begun. Best & Belcher brought $2@$2.15; Consolidated California & Virginia, $1.30@$1.10; Ophir, $1.95@$2; Caledonia, $1.10@$1; Mexican, $1.25, and Confidence, 85c.

Quicksilver, of California, reappeared at $5.50 for the preferred shares and $2 for the common.

The first quarterly dividend of 1.75% on the issued preferred stock of the Federal Mining & Smelting Co. has just been declared. The company is a consolidation of the Empire State-Idaho, Standard and other silver-lead mines in Idaho, and owns a smelter at Everett, Wash. The authorized capitalization is $30,000,000, of which $20,000,000 is preferred stock and $10,000,000 common. Of the common $5,250,000 is outstanding, and of the preferred $10,500,000, a total of $15,750,000, or 52.5% of the capitalization.

Boston. Dec. 8.

(*From Our Special Correspondent.*)

In sympathy with the marked advance in Amalgamated local copper shares have taken a new lease of life, and stocks went up from $1 to $6 during the week. The heavy buying of Monday resulted in more or less profit taking to-day, yet the undertone is

excellent, and many believe that the market will improve still further. It is felt that the metal market is in a better position than generally credited. Considerable Amalgamated Copper has been taken for long account, largely through the utterances of Thomas W. Lawson. Outside of this, interest has centered in Copper Range, Utah, Osceola, Parrot and Centennial, although the whole list is buoyant with the possible exception of Mohawk and Shannon, where selling orders appear to predominate.

A week ago Copper Range was $4 above the price of Amalgamated, but Monday they crossed and closed to-night within $1 of one another, in favor of the former. Copper Range touched $48 to-day, closing at $46.25, a gain of $3.25 for the week. Amalgamated touched $47.37½, closing $6.12½ above a week ago at $45.12½. Utah Consolidated has risen $3.37½ to $30.12½, closing 50c. below this. It is expected that the directors will meet in about a week and declare a $1.50 dividend, making $3 for the year. Now that this company has been divorced from English control, a story is repeated of a large vein of rich ore which has heretofore never been mentioned. New York continues a large buyer of Utah, notwithstanding control of it is held there. Osceola spurted $5.75 to $62, but lost $7.50 of it on realizing. Parrot is up $3.50 to $21.50. It is said that this company has cash in the treasury equal to more than the stock is selling for. Centennial rose $2.50 to $14.75 on limited dealings. Calumet & Hecla is up $15 to $440, Quincy $10 to $90, and Tamarack $14 to $85, but trading in these three stocks is very light.

A No. 1 assessment is announced by the Michigan Copper Mining Company, payable December 21. The delay in beginning the production of copper is the cause of this assessment. There has been nothing doing in the stock. It closed $6.25 bid to-night Bingham has gained $1.87½ to $22.50, although it has been heavy of late. This company has made a contract with the Montana Coal & Coke Co. for the supply of 70 tons of coke per day. Mohawk rose $2.75 to $38.50, reacting $1, and Shannon, after reacting to $7, rallied to $8. A bid of $4 for the 1904 dividend on Amalgamated was made to-day in the local exchange. Trading in Copper Range has been more natural of late, as there has been more or less complaint of the inability to execute trades, owing to the large number of matched orders. A report that the Boston Consolidated Company intended issuing 100,000 additional shares met with a prompt denial from officials. The stock is fractionally lower on the curb at $6.50. The low-priced copper shares have not felt the activity as yet, but prices are firmer. Atlantic sold at $8@$8.50 to-day; Adventure at $3; Allouez at $4.87½; Franklin at $7.50; Phoenix at $3.50; Trinity at $5.25, and Winona at $8.50. Isle Royale is up $1.25 to $7.50 and United States $1.25 to $19.25.

Colorado Springs. Dec. 4.

(From Our Special Correspondent.)

The market at the close of the week's business shows considerable strength. Prices generally have held their own or advanced fractionally. The output for the month of November from the Cripple Creek district was very gratifying, and the ore was all of a good grade. The drainage tunnel is carrying away water at the rate of 3,200 gal. per minute, and altogether the prospects for better prices for mining securities seem brighter than for some time past.

C., K. & N. opened the week at 18, but weakened to 16 to-day, without any apparent good reason. Acacia and Doctor-Jack Pot both sold at 5. Elkton was considerably stronger, selling from 43½ a week ago to 45 to-day, the closing bid being 44½c. El Paso declined from 48¾ last week to 47⅝ to-day. Gold Dollar Consolidated braced up slightly, 2½ being the bid last week and 2⅞c. at the close to-day. Isabella opened the week at 7¼, advanced to 7½, and again closed at 7¼c. Katinka changed hands at 30c. Mollie Gibson was fractionally stronger, selling at 5¼. Pharmacist sold at 2⅜. Portland closed the week strong, a bid of $1 not being sufficient to bring out any stock. Work sold down to 3 during the week, but recovered to 3¾ to-day. Golden Cycle changed hands at 58. Among the prospects, Old Gold was traded in to some extent at lower prices, 9¼ being the figure at which it changed hands to-day.

Salt Lake City. Dec. 5.

(From Our Special Correspondent.)

Business on the Salt Lake Stock and Mining Exchange has been light during the past week; prices continue low, with no change of consequence tending toward the better. May Day, of Tintic, and Butler-Liberal, of Bingham, recorded the heaviest sales. In the case of the former, the buying was done largely by brokers, who had shorts to fill; while in the latter it appears that certain parties seeking a control succeeded in bringing the stock out to a considerable extent. Daly-Judge and all other Park City stocks have been sold low. The usual monthly dividend of 65c. a share, or $117,000, on Daly West, will be paid December 15, with a possibility of stockholders sharing in a Christmas extra at the same time.

Consolidated Mercur closed the week stronger. It is believed that the mechanical defects at the mill have been fully mastered after a long series of annoying delays.

The Butler-Liberal has declared its initial dividend of 0.5c. a share, $2,500, payable December 22.

San Francisco. Dec. 3.

(From Our Special Correspondent.)

Business in the Comstock shares has been a little more lively. At the close, however, sellers were much more abundant than buyers, and a general decline in prices was the result. Some of the leading stocks lost 25c. a share or more. Ophir, however, remained fairly firm and in pretty good demand.

Some quotations noted are: Ophir, $2.20@$2.25; Best & Belcher, $2; Consolidated California & Virginia, $1.35@$1.25; Mexican, $1.25@$1.10; Sierra Nevada, 45c.; Yellow Jacket, 33@30c.; Chollar, 16@15c.; Justice, 13c.

On the San Francisco & Tonopah exchange business was quite dull, with a slight revival toward the close. Montana Tonopah sold at $1.25; Tonopah Midway, 38c.; Tonopah North Star, 35c.; McNamara, 14c.

On the California exchange oil shares were very quiet and sales small. Home changed hands at 95c.; Occidental at 19@20c.; Sunset, 12@15c.; Lion, 4c. Toward the close prices were somewhat steadier.

On the California Stock and Oil exchange the monthly record of sales since January 1, 1903, is as follows:

	Shares.	Value.
January	267,019	$255,202
February	322,445	219,358
March	190,908	151,982
April	236,268	115,571
May	401,454	154,386
June	154,720	117,928
July	74,594	71,890
August	181,478	119,231
September	113,019	69,046
October	73,460	30,322
Total	2,015,365	$6,304,916

The October business was the lighest reported for any month of the year.

COAL TRADE REVIEW.

New York, Dec. 9.

ANTHRACITE.

The anthracite trade which, at eastern points at least, felt the cold wave last week, and showed a considerable increase in orders, is again rather quiet, and another period of cold weather will be needed to increase business. The market is, in fact, as it has been for many weeks, on a weather basis, and there is nothing to indicate that it will be on any different basis this winter.

In Lake Superior territory supplies on docks are ample for the winter's demand, and business is about as active as usual at this season. In Chicago territory, though retail buying has been affected by colder weather, the wholesale trade has shown but slight improvements. Supplies of Lake coal on the docks are so liberal that the outlook is for a quiet winter in all-rail business. Along the lower lakes and in all-rail territory there has been some improvement in demand, but the trade cannot be said to be active. In seaboard territory, as noted before, cold weather caused a temporary increase in buying, but demand is again quieter. The apparently concerted arrangement between the New England railroads and the anthracite roads to discourage shipments of coal by water to territory that can be supplied by all-rail shipments from the mines is having some effect. This movement has been on some months; in fact, it had its beginning last spring. The buying at New York Harbor points, though not heavy, calls for a considerable tonnage, and the same is true of Philadelphia. The small sizes are in good supply, and certain grades may be had pretty cheaply. Prices for the prepared sizes remain at $4.50, f. o. b. New York harbor shipping port for broken, and $5 for egg, stove and chestnut. There is apparently not the slightest possibility of any change in these quotations before next spring.

NOTES OF THE WEEK.

At the annual stockholders' meeting of the Erie Railroad, on December 8, W. C. Lane, president of the Railroad Securities Co. and Standard Trust Co., and Louis L. Stanton, second vice-president of the Standard Trust Co., were elected directors. Eben B. Thomas, now president of the Lehigh Valley Railroad, tendered his resignation. He was succeeded by Mr. Stanton. The former Board of Directors, with the exception of Mr. Thomas, and including E. H. Harriman, were re-elected. Standard Trust Co. interests are closely identified with both Mr. Harriman and J. P. Morgan & Co.

Beginning on January 1, the Pennsylvania Railroad will establish its own sales department for the disposal of the anthracite coal produced by the mines it controls. The names of the agents and the territory they will cover are as follows:

George H. Bressette, in New York, will cover New York and the eastern markets, and New Jersey from Bay Head east.

H. W. Perrin, at Philadelphia, will cover the territory from the Delaware River to Wilmington, Dell., all of New Jersey from Trenton and Bay Head south to the coast, and west to Mifflin, Pa., and south on the Northern Central Railway to Octorara Junction.

C. E. Hitchcock, at Baltimore, will cover the territory from Wilmington, Del., south, including the Delaware Peninsula.

W. H. Curtis, at Wilkes-Barre, Pa., will cover northeast Pennsylvania, that portion of New York State along the line of the Buffalo & Allegheny Valley Division of the Pennsylvania Railroad, and the lines of the company to Sunbury and Lewistown Junction.

The affiliated coal companies of the Pennsylvania Railroad hereafter will be known as the Susquehanna Coal Co., the headquarters being in the principal offices of the Pennsylvania Railroad in Philadelphia.

BITUMINOUS.

The situation in the Atlantic seaboard bituminous trade has improved somewhat during the past week, the improvement being more marked at certain places than at others. The coal supply from Chesapeake Bay ports is fairly good, but not so good from New York harbor shipping ports, where boats are kept waiting for cargoes several days longer than usual. Slow transportation from the mines to tidewater shipping ports and poor car supply at the mines are the principal factors interfering with trade. It is thought, however, that the railroads have purposely brought about these conditions in order to strengthen the market. Prices remain low, as low as $2.10, f. o. b. New York harbor shipping port, is paid for gas slack and $2.40@$2.60 for the poorer grades of Clearfield, while the better grades are selling as high as $2.75. George's Creek coals show a wide variation in price, $3.05@$3.50. There is already talk in trade circles of lower freight rates from the mines to tidewater and lower mine prices for next year. In the far East trade is quiet, as that territory is apparently receiving from the lower ports more coal than it can handle. Along Long Island sound demand has increased. At New York harbor points the market is quiet, especially for the lower grades. In the all-rail trade there has been more improvement than elsewhere, and prices are pretty firmly held, while the tonnage wanted is increasing. Transportation from mines to tidewater is better than it has been, coal now running through in about 10 days. Car supply at the mines is poor and variable, being about 30 to 40 per cent of the requirements. In the coastwise vessel market there is a scarcity of vessels at the lower ports, but the demand is poor, except for small craft; these are wanted. We quote current rates from Philadelphia as follows: Boston, Salem and Portland, 70c.; Portsmouth, 75c.; Lynn, 90c.@$1; Providence, New Bedford and Long Island sound, 65c. From the further lower ports rates are 5@10c. higher. From the New York harbor points the prevailing rates are 50c. to Providence, New Bedford and Long Island sound, and 65c. to Boston.

Birmingham. Dec. 7.

(From Our Special Correspondent.)

The principal topic in coal mining circles in Alabama this week is the reduction in the mining wage, the scale for the present month, reckoned on the selling price of pig iron last month, showing a 5c. reduction for the month. The mining wage now is 47.5c. per ton, the minimum price. The miners have to accept the reduction under their contract with the Coal Operators' Association. Fourteen thousand mine workers are affected by the reduction. The coal production in this State is strong, and no time will be lost from now right up to the commencement of the holidays, as there has been no accumulation of coal. Coal prices remain steady.

Some sales of coal lands are reported for the past week, Texas and Kansas parties this time making purchases. No new development has been started lately, though some prospecting is going on in Walker and Winston counties, while companies organized some time since are preparing to open mines in the western part of Jefferson county.

Chicago. Dec. 7.

(From Our Special Correspondent.)

In general the anthracite business of the last week has about held its own, with conditions better for the retailer than the wholesaler. The sharp weather has caused an active demand from the consumer, but this has not yet been reflected upon the wholesale trade, for the reason that retail stocks were large at the beginning of the cold weather. With the practical closing of lake navigation in the week, transportation conditions for all-rail coal become more important, and there is little to fear at present from this source. The railroads are in good condition and there is a better supply of cars than was apprehended early in

the season. To-day has seen a business that indicates a better condition of anthracite trade this week than last, and, given continuance of the cold, there should be brisk demand from the retail dealers. Chicago's stock of anthracite, as well as the stocks in other western lake ports, is amply sufficient for the winter, to all appearances.

The market for bituminous has been somewhat worse than for anthracite. Western mines are producing in abundance and finding comparatively little trouble in getting their products to the consumer. As heretofore, the demand for Illinois and Indiana coal is greatest in the less expensive grades. Screenings bring $1.10@$1.55; run-of-mine, $1.65@$2.15, and lump $3@$3.25. Hocking is shading off by as much as 50@60c. for lump from the circular price of $3.90; the demand for Hocking is good, and the best grades hold up well as to quality of sales and price; domestic lump brings $4.25@$4.50. Smokeless is again in greater supply than demand; the "gentlemen's agreement" of last month cannot overcome market indifference and there is a surplus of smokeless, for which dealers are glad to get 25c. to 40c. less than the established prices of $3.65 for run-of-mine and $4.30 for lump and egg, with discounts greatest on the lower priced grades. Youghiogheny and Pittsburg are in light demand at $3.40@$3.75. Cannel continues steady and in good demand at $5@$5.50.

Cleveland. Dec. 8.

(From Our Special Correspondent.)

The coal trade is still in the dumps. At a meeting of the Coshocton operators, held in Cleveland a few days ago, it was decided to reduce the price to the dealer 15c. a ton. This brings the price down to $2 at the mines for lump, domestic coal. The Massillon operators have not as yet met the reduction, holding for the old price of $2.80 at mine, which makes the price $3.50 to dealers, delivered in Cleveland. The situation is very little, if any, stronger.

The steam coal situation has not improved to any appreciable extent, and the operators are feeling strongly the need of cutting down production. Prices have held steady at the old basis. Pittsburg run-of-mine, steam coal, has been bringing $1.30 at the mine and Ohio coals have been bringing $1.10@$1.15, at mine, for run-of-mine.

The coke situation is much easier than it has been, the market having improved with the better facilities on the railroads. The light consumption, however, has made it hard for the ovens to market all of their output, and there has been some talk of curtailment. Prices have been weak, without any reduction having been made. Good 72-hour foundry coke, Connellsville, has been selling at $2.65 at the oven, with high sulphur cokes bringing about $2.40 at the oven.

The lake movement is about over for the year. The last cargoes are being sent up the lakes now. It is evident that some few high-priced cargoes will move later, shippers desiring to clean up their contracts and being willing to pay high freights. The situation has so far warranted no excessive increase, 75c. being paid on a few loads, but it is hardly believed that on the few boats yet to go the rates will advance to $1, which has been predicted.

Pittsburg. Dec. 8.

(From Our Special Correspondent.)

Coal.—Prices are much weaker and production is being curtailed. The lake shipping season closed on Saturday at noon as to insurance, and all shipments made since that time were at the owners' risk. The Pittsburg Coal Co. loaded one vessel yesterday for the northwestern market, and this will be the last shipment of that company. A meeting of coal operators was held last night, at which the river and railroad coal combinations and the independent interests were represented. The object was to consider plans to curtail production and maintain prices for the rest of the year. No definite action was taken, but the matter was left to a committee, which will prepare a plan and make a report at a meeting to be held early next week.

Connellsville Coke.—The committee of coke operators appointed to prepare plans for regulating the trade has held several meetings, but is not yet ready to report. Standard furnace coke is quoted at about $1.75, and prices for foundry coke range from $2.40 to $2.65. Productions and shipments show a slight increase. The *Courier*, in its last report, gives the weekly production at about 120,000 tons. The shipments for the week aggregated 5,506 cars, distributed as follows: To Pittsburg and river tipples, 2,516 cars; to points west of Pittsburg, 1,480 cars; to points east of Connellsville, 1,510 cars.

San Francisco. Dec. 3.

(From Our Special Correspondent.)

The coal market is quiet. Prices are unchanged. Rocky Mountain coal still holds the advance made recently on account of the strikes in Utah and Colorado.

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite; $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is still nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland, with very light stocks. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite; $8.50 for cannel, $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. Dec. 9.

Export trade continues quiet. No special efforts are being made to increase it at present. The firmer tone of ocean freights has largely offset the lower prices of coal at seaboard ports.

Imports of coal into France for the nine months ending September 30 were 8,326,330 metric tons, against 7,903,880 tons in the corresponding period of 1902; an increase of 422,450 tons. Of the imports this year, 4,370,370 tons were from Great Britain, 2,808,570 tons from Belgium, and 789,180 tons from Germany. The imports from Great Britain decreased, and those from Belgium were nearly stationary; while those from Germany increased largely.

Imports of coal into Egypt in 1902 were 1,958,710 tons, of which, however, 1,104,553 tons were for the use of steamers at Alexandria, Suez and Port Said. Of the total, 12,616 tons were from the United States.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of November 28 that the Welsh coal market remains unchanged, and the tone is steady throughout. Quotations are: Best Welsh steam coal, $3.72; seconds, $3.66; thirds, $3.54; dry coals, $3.60; best Monmouthshire, $3.30; seconds, $3.18; best small steam coal, $2.10; seconds, $1.98; other sorts, $1.60.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth, or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The outward freight market remains quiet, with rates weak and unchanged. Some rates noted from Cardiff are: Genoa, $1.20; Naples, $1.14; Las Palmas, $1.32; St. Vincent, $1.50; Rio Janeiro, $1.92; Santos, $2.22; Buenos Aires, $1.68.

IRON TRADE REVIEW.

New York, Dec. 9.

Accounts from the iron trade are slightly contradictory, but the general drift of matters seems to be that there has been a slight increase in buying of raw material. The southern blast furnaces have secured enough orders at the low prices recently offered to clear off their accumulated stocks and to keep the furnaces going for some time; and, accordingly, an advance of from 25 to 50c. per ton has been made by sellers. This does not seem, however, to have checked buying, and the business is reported as being a little more active. In the Pittsburg district very little has been done in bessemer pig, but there has been some business in foundry and gray forge. It is understood that considerable Alabama foundry pig has been placed in Pittsburg. In steel billets prices are unchanged, but business has been comparatively light.

In finished material, very little seems to be doing, and reports of new business are rather scarce. There is still an expectation of lower prices on plates and structural steel. Meetings of the producers are to be held next week, but it is impossible to predict what action will be taken. Unless something unexpected happens, there will be little change in the trade in finished material until after the close of the year.

It is announced that the Carnegie Steel Co. has withdrawn from the pool, which has been maintaining the prices of ferro-manganese and spiegeleisen, and the market is now an open one.

There is still a good deal of talk of export business, and it is understood that some orders have been already taken, while others are under negotiation.

Birmingham. Dec. 7.

(From Our Special Correspondent.)

The Alabama pig iron market is stronger this week than it was two weeks ago, and No. 2 foundry iron is reported firm at $9.50 per ton. The sales have been large and steady, and, even at the improved price, are favorable. There are indications that the consumers need iron, and that there will be an improvement in the buying right along.

The sales during the month of November aggregate well. The Sloss-Sheffield Steel & Iron Co. announces that it sold during last month over 85,000 tons of iron, 42,000 tons of which were moved out in November. Effort is being made by this company to ship out the greater portion of the balance this month, and the railroads are being urged to furnish cars. The Tennessee Coal, Iron & Railroad Co. and other concerns also sold iron liberally last month. An investigation of the sales books by the Tennessee and Sloss-Sheffield companies miners' committees revealed the fact that the average price of pig iron was under $9 per ton; that is, No. 3 foundry, which is taken now as the average grade of iron. The miners got a reduction in their wage, their contract being based on the selling price of iron. It is not denied that some iron has sold as low as $8.75 per ton for No. 3 foundry.

There has been no further curtailment of production in this State. The new furnace of the Alabama Steel & Wire Co., Gadsden, is nearing completion rapidly, but it is not expected to go into operation for a few weeks yet. The new furnace of the Tennessee Coal, Iron & Railroad Co. at Ensley and the new furnace of the Lookout Mountain Iron Co. at Battelle, between Birmingham and Chattanooga, are both nearing completion. The Woodward Iron Co. has its furnaces in operation at Woodward, the accident which took place there a couple of weeks since interfering but little with the daily production of the plant.

No. 2 foundry is quoted at $9.50, though sales are reported at $9.25. No. 1 foundry is selling between $9.50 and $10 per ton.

Some iron has been going from this district recently for the export trade. It is learned that the Tennessee Co. sold a little iron to be shipped through Pensacola, and that recently an order for 1,000 tons was started.

The finished iron and steel market shows no change. The Birmingham rolling mills, belonging to the Republic Iron & Steel Co., are still quiet. Mills at Gate City and Bessemer, in the immediate Birmingham district, Gadsden and Anniston, the latter two places being connected with car-building establishments, are in operation.

Very little is doing in the steel plant in Ensley, though rumors are heard that the idleness will last but to the end of this year. The steel wire, rod and nail mills at Ensley, belonging to the Alabama Steel & Wire Co., will resume operation about February 10. It is understood that by February this company will be able to manufacture steel at its own mills at Gadsden.

There is not much work in hand in many of the foundries and shops here, and the expectations are there will be no change until after the first of the coming year.

Several new iron and steel concerns are anticipated for this district in the next few weeks. Messrs. Campbell & Hawkins, of Detroit, Mich., have been in Anniston investigating a site for the location of a steel plant. The gentlemen intend putting up a plant to manufacture sheet and plate steel under the Hawkins patent. It is not certain yet whether the plant will be erected or not at Anniston. The Birmingham Commercial Club has a committee at work to secure the location of a large steel-casting plant, a certain amount toward the stock to be subscribed here.

Chicago. Dec. 7.

(From Our Special Correspondent.)

In the last week the minimum price of Southern pig iron has stiffened 25c. for the local market. This advance occurred on Saturday last and though not great, it has encouraged agents and with other features of the market points to a better condition of the market in the near future. It raised Southern No. 2 from $9 to $9.25 Birmingham, or $13.10 Chicago, for sales on the most favorable terms, and, like other advances of similar nature in the history of the trade, has encouraged buying in the belief that it means higher prices generally. The minimum for northern No. 2 continues to be $14 and the situation for northern is improving with the maintenance of this figure. Prophecy about markets is always rash, but to all appearances there will be a slow improvement henceforward, with production curtailed in the most important producing centers of the country. Orders average a little larger than they have been, and the time between orders and deliveries is lengthening, being now sixty days to six months, with a preference of buyers for the shorter limit, as heretofore.

In the Chicago district, the most important closures have been those of the United States Steel Corporation and two furnaces of the International Harvester Co. at South Chicago. One furnace of the United States Steel is making foundry iron at South Chicago, and the two furnaces of the Iroquois Iron Co. are in operation. Thomas furnace at Milwaukee and Sidney furnace at Mayville, Wis., are also running. By the putting out of blast of one or two of the five furnaces running, a beneficial effect upon the iron industry in the district could be produced, but this would make necessary some combination for sharing of the losses incurred, and no such combination exists, nor, to all appearances, is it likely to be formed. Northern iron is in steady demand for mixtures and it has certain advantages of location not possessed by southern furnaces. All things considered, the prospect for northern in the local market seems better than the prospect for southern.

Coke is abundant and sells for $4.90@$5.15. The transportation situation, by which the prices of coke is largely regulated, is better than anyone in the trade

hoped for a month ago, but it is not ideal yet, by any means. So long as present conditions hold, however, there will be no trouble and no sharp advance in the price of coke.

Cleveland. Dec. 8.

(From Our Special Correspondent.)

Iron Ore.—The season for the shipment of iron ore down the lakes is over, the last cargoes being now on their way down. The rates held firm to the end, not having been changed since the middle of May. The question of ore prices is coming to be an interesting one and preliminary meetings for the fixing of next year's scale will be held soon. The total movement for the season, by lake, has not been figured as yet.

Pig Iron.—The market in this territory has taken a spurt. The buying movement, which has come within the past few days, has taken in quite an amount of material for this year's delivery, together with orders for the first three months, some contracts of importance for delivery during the first six months of next year and one contract which entails delivery all through the coming year. The market, therefore, shows a very much better tone as a whole. The orders, have been running, for future delivery, from 500 to 1,000 tons, and this gave a much better tone to the whole situation. It is evident that some of the smaller foundries, which feed the smaller class of manufacturing establishments, have been leaders in the activity, while those which find their market with the agricultural implement works have been getting a better chance at business. The revival in the trade before the time of taking inventories in January is taken as indicative of a much better tone to the market after the first of the year. The price situation is very much improved. The Southern producers are getting down to the point where they are demanding a certain profit. The larger part of them have demanded that no orders be taken for less than $10, Birmingham, and an increasing number have advanced to $9.50, Birmingham, for No. 2. Northern furnaces are finding the market stronger and have not been forced to make any reductions under $14 in the Valleys for No. 2. Bessemer and basic are nominal at $14.50, Pittsburg.

Finished Material.—The market for sheets has not changed much. The outside work, such as roofing and the like, has fallen off with the approach of cold weather and the remainder of the trade, while picking up somewhat, has not overcome this loss. The approach of the time when inventories are to be taken has also had its influence. The market is dull at old prices, namely 2.50 for No. 27 black sheets out of stock; 2.35 for No. 27 in car-lots at mills. Galvanized sheets are being quoted at 75, 10 and 2½ off list for gauges from No. 22 and lighter, while the other gauges are quoted 70 and 10 off list. The bar situation has been somewhat stronger, the agricultural implement works showing a tendency to specify against their old contracts with greater freedom, and the buying of new amounts on contract having increased. The whole situation is therefore improved. The prices have held at 1.30c., Pittsburg, for bessemer and 1.40c., Pittsburg, for open-hearth. The bar iron situation has changed a little, the mills meeting competition by quoting prices which will enable them to compete with the Youngstown mills, which are quoting 1.30c., Youngstown. In some places the waiving of freight rates has lowered the price. The structural steel situation shows that some business is being withheld in an attempt to break the prices, while the other amounts are being withheld from the market pending the reduction which will come, it is believed, the first of the year. The plate trade has held steady with very little change. Both prices have held firm at 1.60c., Pittsburg. No change has been seen in the billet and rail trade, both being nominal.

New York. Dec. 9.

Pig Iron.—The market shows little change and no improvement is expected till after the holidays. We quote as follows, for northern irons, good brands: No. 1X foundry, $15.25@$15.75; No. 2X $14.50@$14.75; No. 2 plain can be had for 50c. less; while gray forge is selling around $13.50. For Southern irons, on dock, quotations are: No. 1 foundry, $13.50; No. 2 foundry, $13, with lower grades in proportion. No. 1 soft can be had at about $13.50 and No. 2 soft at $12.75; while gray forge may be quoted somewhere around $11.50.

Bar Iron and Steel.—The market remains unchanged. Common bars are selling at 1.40c. in large lots, with steel at about the same.

Plates.—Demand continues very light. Sheared plates are quoted as follows: Tank, ¼-in. and heavier, 1.78@1.83c.; flange, 1.95@2.05c.; marine, 2.10@2.15c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33@$36, according to weight.

Structural Material.—Buying is light. For large lots at tidewater, nominal quotations continue 1.75 @2c. for beams, angles, channels and tees.

Philadelphia. Dec. 9.

(From Our Special Correspondent.)

The pig iron situation has not changed. The improvement which is spoken of in other markets is not felt to any degree here. There has been considerable correspondence between consumers here and Alabama pig iron makers, but, for some unexplained cause, these negotiations do not result in much business. Our larger consumers here are pretty well protected by promises or assurances that their requirements will be covered at fixed figures. They are, therefore, permitting the present improving tendency to crop out a little more before they take steps. The condition is rather cloudy. There have been so many false alarms and so many false signals raised that our people are determined to wait after the holidays before they place large contracts. The larger pig iron interests are refusing to make any additional shading. They believe that the curtailment in production will very soon produce good fruits. Some concerns that thought of blowing out at the end of the year have announced this week that they will not. Several inquiries have been received within a few days from consumers of No. 1 foundry. Gray forge is very slow of sale, and basic is under active inquiry just now; but manufacturers do not talk as though they thought the inquiries would amount to anything. Quotations may be fairly given at $16 for No. 1X; $15 for No. 2X; $14.50 for No. 2 plain; $13.50 for No. 2 southern, by rail, and 50c. less by water. Standard forge is to be had at $14 and basic at practically the same figures.

Steel Billets.—Some negotiations are well under way this week, which means large transactions in billets, at prices which the market will know nothing of. Two large buyers have practically closed for large lots. Current quotations remain where they have been, which is near $25 delivered.

Merchant Bar.—There is a very quiet movement in bar, nearly all from store. Mill owners report no new business, but claim that their larger customers are so nearly out of stock and they will undoubtedly be heard from early in the new year. Best refined is quoted at 1.45 and steel bars at the same for large lots. Stocks of merchant bars are light because mills are working only to order.

Structural Material.—Representative say that they do not expect any business worth reporting to be closed before the end of the year; in the meantime they think there will be modifications in raw materials which will enable them to make concessions in shapes. The usual quotations are still named on all business.

Steel Rails.—Steel rails are not selling in this market. The only business worth speaking of is some orders for light sections.

Old Rails.—Old rails continue to be quoted at $16 for iron and $12 for steel.

Scrap.—There is no sign of movement in the scrap market as yet.

Pittsburg. Dec. 8.

(From Our Special Correspondent.)

There is a much better feeling in the iron and steel market than for several weeks past. A number of sales of bessemer pig iron have been made and inquiry has increased. The market is fairly firm at $14, Valley furnace, but on a good round tonnage it is likely this figure could be shaded. J. G. Butler, Jr., chairman of the Bessemer Furnace Association, issued a statement yesterday that the idle capacity of the blast furnaces tributary to the Lake Superior ore region is now 57 per cent. In the whole region which is known as the Central West he said there are 65 furnaces in blast and 91 idle. The total daily capacity of these furnaces is 37,000 tons, or an annual capacity of about 14,000,000 tons. The most important development in the pig iron market during the week was the reaction in prices of southern iron. There has been an advance in the No. 2 foundry grade to $9.25, Birmingham, and some sellers are holding out for $9.50. This has had an effect on northern iron, which is much firmer this week. A large tonnage is said to have been sold in this district within the past month at the $9 quotation, which is equivalent to $13.35 delivered at Pittsburg. Southern forge also is firmer but none is being sold here. Wage reductions averaging about 10% are being made in the blast furnaces in the Central West and as coke prices have dropped more than $1 a ton, consumers seem to doubt that bottom prices have been reached, although producers state positively that less than $13.75, Valley furnace, cannot possibly be done. Active buying may be delayed for at least 60 days or until the ore prices for next year are announced. The Carnegie Steel Co. has withdrawn from the English Ferro-Manganese Association and expects to supply the entire American trade. As a result, the market is an open one and prices have declined $2 to $3 during the week. Carloads are quoted at $47, delivered, for 80 % domestic and large lots can be had at a lower figure. The Carnegie Co. was out of the market most of the year, being too busy to make ferro except for its own requirements.

The steel trade shows an improvement this week, which is indicated by the starting of a number of idle mills. The bessemer plant of the Republic Iron & Steel Co., at Youngstown, resumed operations on Sunday night, and orders were issued to start the Brown-Bonnell plant and part of the Valley plant. The upper and lower works of the American Steel Hoop Co., now under the control of the Carnegie Steel Co., and the plant at Girard will go on in full this week. Mills in the Pittsburg district are making a large tonnage of steel products for export. Some large orders for wire and tin-plate bars have been received. An important two days' meeting of the principal officers of the United States Steel Corporation and the heads of the subsidiary companies was held here last week. The sessions were secret and no official information was given out as to the object. It is understood, however, that the chief question under consideration was reduction in the producing costs. These will include wage and salary cuts in almost every department. According to agreement 90 days' notice was given on October 1 by the Carnegie Steel Co. of a re-adjustment of wages at all of its steel-plants. President Thomas Lynch, of the H. C. Frick Coke Co., was called into the meeting last week, and it is certain the question of wages of the coke workers was considered. Last Christmas the company surprised the employees by granting a voluntary advance in wages. At that time furnace coke was selling at $3 a ton. The present selling price is about $1.75 and there is no doubt that the voluntary advance will be recalled, and in addition a further reduction likely will be ordered. No trouble is feared through wage reductions, as the men expect lower wages on account of the decline in prices. Through the urgent request of the officers of the Independent Sheet Manufacturers' Association the date for the special convention of representatives of the sheet mill lodges of the Amalgamated Association of Iron, Steel and Tin Workers was advanced and the meeting opened here this morning. All independent manufacturers and representatives of the American Sheet Steel Co. have been invited to attend and explain the situation to the delegates. The independent manufacturers for months have been urging the Amalgamated Association to remove the limit of production on sheets, in order to enable them to compete with the non-union establishments of the United States Steel Corporation. Since that time the sheet company of the corporation has reduced the wages of the tonnage men in its non-union plants 20%. The independents now ask for a wage concession, in addition to the removal of the limit. It does not seem likely that the request will be granted.

Pig Iron.—There have been a few sales of bessemer pig iron at $14, Valley furnace, and it is reported that one or two lots sold as low as $13.60, or $14.50 delivered at Pittsburg. A large number of inquiries have been received for iron for next year's delivery. Foundry No. 2 is quoted at $14.25@$14.50, Pittsburg, but some small sales are reported as low as $14. Gray forge is quiet and is quoted this week at $12.75, Pittsburg. Southern forge can be had at about $12.35.

Steel.—There has been but little change in the steel market. The pool price of $23 for bessemer and open-hearth billets is being strictly observed. The billet, plate and beam pools are scheduled to meet in New York next week. It is not expected that any changes will be made in prices. Steel bars are still quoted at 1.30c. and plates at 1.60c.

Sheets.—The sheet trade is not in particularly good shape; although the sales compared with a year ago are not less, but prices are considerably lower. No. 28 guage black sheets are still quoted at 2.35@2.40c., but it is reported that sales have been made at a lower figure. Galvanized is quoted at 3.40@3.45c.

Ferro-manganese.—The market is open and domestic 80% is now quoted at $47; and sales have been made at a lower figure.

Cartagena, Spain. Nov. 21.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Since our last report there have been shipped three cargoes, 8,500 tons dry ore, all to Great Britain. Business has been a trifle more active, but orders received are mostly for odd cargoes. Freight rates are easier.

Prices remain nominally at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50% ore; 7s. 3d.@7s. 9d. for special low phosphorus; 8s. 9d. for special ore; 9s. 3d. for 58% specular ore. Magnetic ore, 60% iron, is 11s. 6d. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20% manganese and 20 iron, to 9s. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43% sulphur and 40% iron, are quoted at 10s. 6d. per ton, f. o. b. Cartagena. No shipments reported for the week.

CHEMICALS AND MINERALS.

(See also prices-current on page 916.)

New York, Dec. 9.

But a few weeks remain for closing this year's business, and already there are signs of quiet in many lines, notably in those branches where 1904 contracts have nearly all been placed. Current trading is of a hand-to-mouth character, and prices are generally nominal, excepting on future deliveries.

Raw materials are again firm, and the recent cut in lead has resulted in shaving down pigment prices.

Cyanide.—The movement either way—import or export—is small, and some variation is also shown in the domestic consumption, owing to the advancing winter. Importers at New York continue to quote on the basis of 20c. per lb.

Bleaching Powder.—About all the large consumers are booked over next year at $1.25 per 100 lb. for prime British and American, and $1.20 for Continental at seaboard. The lower grades have been sold at a discount. Prompt business is purely retail in character.

Copper Sulphate.—Quiet, at $4.70@$4.75 per 100 lb., f. o. b. works.

Acids.—Consumers of the more important commercial acids are booked for 1904 delivery, and in the case of sulphuric the quantity is said to be larger than the current year.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l	$5.00@$5.50
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.37½	Sulphuric, 60°, bulk, ton	18.00@20 00
Nitric, 38°	4.75	Sulphuric, 66°	1.20
Nitric, 40°	5.00	Sulphuric, 66°, bulk, ton	21.00@23.00
Nitric, 42°	5.37½		

Brimstone.—The arrival of another cargo, 3,130 tons, has further replenished stocks. Spot sales of best unmixed seconds are reported at $22 per ton, which, by the way, is the same price asked for shipments. Best thirds are nominally 50c. less than seconds.

The statistical position of brimstone in Sicily in the 10 months ending October 31 is shown below, in long tons:

Exports to:	1902.	1903.	Changes.
United States	133,463	128,507	D. 4,956
France	47,349	55,720	I. 8,371
Italy	42,178	41,204	D. 964
Other countries	165,650	182,131	I. 16,481
Total	388,640	407,562	I. 18,922
Stocks, October 31	338,644	355,300	I. 16,656

It is noteworthy that the exports to the United States this year, consisting of 101,097 tons best seconds and 27,410 best thirds, show a decrease of 3.7%, while the movement to France has grown nearly 18%. The total increase is equivalent to about 5%. Stocks at seaboard in Sicily are also 5% larger.

Pyrites.—There has been a slight relaxation in demand, but as deliveries are made on time contracts, current quotations do not show a change.

We quote: Domestic pyrites, $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@12c. per unit for lump, and 10@10½c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Importers quote spot at $2.25 per 100 lbs.; December-January, $2.10; February, March, $2.075; April, $2.05; May-June, $2.025; July-December, 1904, $1.975@$2. Demand is principally for deliveries on contract. An easier spot market is expected, as several cargoes are booked to arrive soon.

Chilean Nitrate of Soda Market.—Messrs. Jackson Bros., of Valparaiso, write under date of October 31 as follows: The nitrate market has been comparatively quiet, but prices have been maintained for prompt 95% at 7s. ½d.@7s. 1d., while December has fetched only 6s. 11d.@6s. 11½d., and February-March, 6s. 8½d.@6s. 8d. For May-December deliveries, 6s. 5½d. was paid, as also for monthly parcels, April-July, all steamer terms. In the refined class, one parcel, November-December, changed hands at 7s. 3d. alongside, and 7s. 1½d. is reported to have been paid for January-February. Producers on the whole show little anxiety to sell, and we quote 95%, November, 7s 1d.; December, 6s. 11d.; January, 6s. 9½d.; February-March, 6s. 8½d., and April-December, 6s. 5½d., while 96%, November-December, is held for 7s. 3d., and January-March for 7s. 1d., all ordinary terms. The price of 7s. 1d. per qtl., with an all-round freight of 13s. 9d., stands in 9s. 7d. per cwt., net cash, and freight, without purchasing commission. Sales for the fortnight were 488,000 qtls.

Sulphate of Ammonia.—Good gas liquor for shipment is a little stronger at $3.10@$3.125 per 100 lb., but business is limited.

Phosphates.—Abroad sellers are worried over the unexpected drop in the price of basic slag, an important ingredient, especially in Germany. Nevertheless, the phosphate market is still firm, and will likely continue so, at least as far as the better grades of American rock are concerned.

It is interesting to note that a ton of phosphates, mined in New Zealand, was recently received in London, England, probably for experimental purposes. Phosphate mining in New Zealand is comparatively recent, and as the deposits of Otago are extensive, there is no doubt that large exports can be made, provided ocean freights are not too high.

Phosphates.	Per ton. f. o b.	United Kingdom or European ports. Unit.	Long ton.
*Fla. hard rock (77@80%)	$7.25@$7.50	6¾@7⅞d.	$10.53@11.70
*Fla. land peb. (68@73%)	3.75@ 4.00	5⅛@5¾d.	7.70@ 8 05
†Tenn. (78@82%) export	4.00@ 4.25	6½@7d.	10.40@11.20
†Tenn. 78% domestic	3.75@ 4.00	.....	.....
†Tenn. 75% domestic	3.50	.....	.....
†Tenn. 73@74% domestic	2.95@ 3.20	.....	.....
†Tenn. 70@72% domestic	2.70@ 2.95	.....	.....
‡So. Car. land rock	....@ 3.25	.....	.....
‡So. Car. riv' rk. (55@63%)	2.75@ 3.00	4⅝@5½d.	5.55@ 6.60
Algerian (63@70%)	.....	5 @5⅛.	6.60@ 7.26
Algerian (58@63%)	.....	4⅝@5¼.	5.50@ 6.30
Gafsa (Tunis)	.....	5@5⅛.	6.00@ 6.60
Christmas Isl. (80 85%)	.....	7⅛@8¼d.	12.38@13.61
Ocean Island (82@88%)	.....	7⅞@8⅛	13.39@14.45

*Fernandina, Tampa, Brunswick, Savannah or Port Inglis.
‡Mt. Pleasant. †On vessels, Ashley River.

Liverpool. Nov. 25.

(Special Report of Joseph P. Brunner & Co.)

There is nothing of special interest to report as regards the position of heavy chemicals, the market being quiet but steady.

Soda ash, for tierces, is quoted as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces. Soda crystals are in request at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is firmly held for full prices as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for export to the Continent and a few other quarters.

Bleaching powder is rather inactive on spot, but quotations are fairly steady, at about £3 15s.@£4 5s. per ton, net cash, for hardwood packages, as to market.

Chlorate of potash is neglected, and 2½d. per lb., net cash, is quoted for English make.

Bicarbonate of soda is selling at £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages; also special terms for a few favored markets.

Sulphate of ammonia is rather more inquired for, and quotations are steady at £12 2s. 6d.@£12 5s. per ton, less 2½% for good gray, 24@25% in double bags, f. o. b. here.

Nitrate of soda is rather easier in spot at £9 15s.@£10 per ton, less 2½% for double bags, f. o. b. here, as to quality and quantity.

METAL MARKET.

New York, Dec. 9.

Gold and Silver Exports and Imports,

At all United States Ports in October and Year.

Metal	October. 1902.	October. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports	$1,400,829	$352,177	$32,457,158	$41,889,028
Imports	11,118,446	5,015,656	36,024,938	36,656,328
Excess	I. $9,657,617	I. $4,663,679	I. $3,567,790	E. $5,232,700
Silver:				
Exports	4,382,586	3,145,532	39,963,105	28,053,967
Imports	2,798,736	2,733,655	21,502,580	19,334,924
Excess	E. $1,583,830	E. $411,877	E. $18,460,525	E. $8,719,033

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending December 9 and for years from January 1.

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week	$72,642	$200,284	$605,420	$12,122	E. $465,656
1903	31,812,127	16,041,433	30,783,825	3,265,454	E. 43,289,065
1902	25,036,292	2,704,328	24,955,641	1,161,344	E. 46,096,231
1901	45,780,389	4,637,055	29,659,459	2,563,761	E. 68,299,032

Business generally is quiet, as is usual at this season of the year. Conditions in the West are good, however, and some revival is looked for in January. More gold has been taken in London this week for shipment to New York, making a total of nearly $15,000,000 on the present movement.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings of the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd.	$162,620,800	....	$151,611,600	....
England	161,097,625	....	156,411,870	....
France	508,106,965	$221,642,820	478,553,295	$221,887,770
Germany	160,280,000	59,280,000	166,300,000	58,435,000
Spain	71,650,000	98,500,000	72,610,000	95,550,000
Netherlands	23,493,000	32,634,000	20,602,000	31,970,000
Belgium	14,940,000	7,470,000	15,683,335	7,841,915
Italy	83,735,000	10,416,000	105,450,000	16,525,500
Russia	377,450,000	32,265,000	405,895,000	33,355,000
Austria	233,700,000	61,370,000	232,910,000	61,030,000

The returns of the Associated Banks of New York are of date December 5, and the others December 3, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending December 5 gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and deposits	$881,552,000	$881,437,000	$882,002,300
Deposits	938,958,100	879,762,600	842,900,400
Circulation	31,986,400	45,506,600	46,058,100
Specie	169,530,700	162,620,800	151,611,600
Legal tender	71,816,500	67,293,600	65,418,800
Total reserve	$241,347,200	$229,914,400	$217,030,400
Legal requirements	234,739,525	219,940,650	210,725,100
Balance surplus	$6,607,675	$9,973,750	$6,305,300

The silver market has suffered a sharp fall the past week, collapsing on December 8 to 25d. in London on re-selling of Indian banks and realizing of speculative holdings. The fall seems to have been overdone, as the market has reacted to 25 5-16d. and closes uncertain, depending on Indian orders.

The United States Assay Office in New York City reports receipts of 30,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to November 26 are reported by Messrs. Pixley & Abell's circular as follows:

	1902.	1903.	Changes.
India	£5,844,630	£6,213,330	I. £368,700
China	162,500	310,060	I. 147,440
Straits	756,470	746,879	D. 9,591
Total	£6,763,600	£7,270,269	I. £506,669

Receipts for the week were £82,000 in bar silver and £29,000 in Mexican dollars from New York, £15,000 bar silver and £41,000 Mexican dollars from the Straits, £8,000 bar silver from Australia, and £4,000 from Chile; total, £179,000. Shipments were £170,000 in bar silver and £26,000 Mexican dollars to Bombay, and £98,000 bar silver and £21,600 Mexican dollars to Calcutta; total, £315,800.

Indian exchange has been firm, and the Council bills offered in London were all taken at an average of 16.03d. per rupee. Purchases of silver on Indian account have been fair. A good deal of gold continues to be sent to India from Australia under orders placed some time ago. These purchases, however, are now apparently at an end.

The Treasury Department's estimate of the amount and kinds of money in the United States on December 1 is as follows:

	Total.	In Treasury.	In circulation.
Gold coin (including bullion in Treasury)	$1,298,107,736	$267,011,715	$627,025,092
Gold certificates	....	....	404,070,929
Silver dollars	554,739,235	7,438,193	80,799,960
Silver certificates	....	....	466,501,062
Subsidiary silver	105,236,815	8,106,009	97,130,806
Treasury notes of 1890	16,428,000	46,720	16,381,280
U. S. Notes	346,681,016	2,387,365	344,293,651
National bank notes	421,106,979	8,141,361	412,965,618
Total	$2,742,299,781	$293,131,363	$2,449,168,418

Population of the United States December 1, 1903, estimated at 81,061,000; circulation per capita, $30.21. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the government. This statement of money held in the Treasury as assets of the government does not include deposits of public money in national bank depositaries, to the credit of the Treasurer of the United States, and amounting to $158,627,355. The total amount in circulation shows an increase of $21,773,550, as compared with November 1; and an increase of $96,458,260, as compared with December 1 of last year.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.41	$0.41½
Peruvian soles and Chinese pesos	.39	.44
Victoria sovereigns	4.85	4.88
Twenty francs	3.86	3.88
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

1 December	Silver—Sterling Exchange.	Silver—N. Y. Cts.	Silver—London, Pence.	Copper—Lake, Cts. per lb.	Copper—Electrolytic, Cts. per lb.	Copper—London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter—N. Y., Cts. per lb.	Spelter—St. Louis, Cts. per lb.
3	4.83¼	56⅛	26¼	11¾ @12	11⅝ @11⅞	55⅛	26⅛	4.05 @4.10	4.65	4.47½
4	4.83⅛	55¼	25¾	11¾ @12	11⅝ @11⅞	54¾	26⅛	4.05 @4.10	4.65	4.47½
5	4.83¼	55⅜	25⅞	11¾ @12	11⅝ @11⅞	....	26¼	4.05 @4.10	4.65	4.47½
7	4.8310	55⅛	25⅞	11¾ @12	11⅝ @11⅞	54¾	26⅜	4.05 @4.10	4.62½ @4.65	4.45 @4.47½
8	4.8270	53⅝	25	12 @12¼	11¾ @12	56⅜	26⅝ 27	4.05 @4.10	4.62½ @4.65	4.45 @4.47½
9	4.8295	54⅜	25 7/16	12 @12¼	11¾ @12	56⅜	27¼	4.05 @4 10	4.62½ @4.65	4.45 @4.47½

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars: the price of electrolytic cathodes is usually 0.25c. lower than these figures

Copper.—The market shows a distinct improvement. A large business has again been done for export, and home consumers have now also entered the market. It is not believed that there are any large stocks of refined copper at any of the works. Prices have advanced to 12@12¼c. for Lake; 11¾@12c. for electrolytic in ingots, cakes and wirebars; 11½@11¾c. in cathodes; 11½@11¾c., for casting copper.

The market for standard copper in London, which closed last week at £54 15s., opened on Monday at the same price, and the closing quotations on Wednesday are cabled as £56 7s. 6d.@£56 10s. for spot, £56@£56 2s. 6d. for three months.

Refined and manufactured sort we quote: English tough, £58@£58 10s.; best selected, £59 5s.@£59 10s.; strong sheets, £66@£67; India sheets, £63@£64; yellow metal, 6¼d.@6⅜d.

Exports and imports of copper at New York, Philadelphia and Baltimore, in the week of December 8 and for the year to date, were in long tons:

	Week.	Year.
Austria	20	5,464
Belgium	61	1,231
France	1,334	22,242
Germany	1,054	27,676
Holland	522	38,781
Italy	169	3,114
United Kingdom	294	16,564
Other countries	263	4,975
Total copper	3,717	120,047
Matte	...	286
Imports—		
Copper	339	24,893
Matte	...	984
Ore	...	39,665

Exports show an increase, especially to France and Germany. Of the imports 289 tons were from Mexico and 50 tons from Great Britain.

Tin.—The market has developed considerable strength, culminating in a sharp advance on Wednesday. The closing quotations are given as 27@27⅛c. for spot and futures. There is a fair consumptive demand.

The foreign market, which closed last week at £119, opened on Monday at £118 15s., advanced on Tuesday to £120 5s., and the closing quotations on Wednesday are cabled as £123 2s. 6d.@£123 5s. for spot, £124 7s. 6d.@£124 10s. for three months.

Lead is quiet but firm. The ruling quotations are 4@4.02½c. St. Louis, 4.05@4.10c. New York. Early deliveries are in good demand and difficult to obtain.

The foreign market is steady, Spanish lead being quoted at £11 1s. 3d.@£11 2s. 6d., English lead £11 3s. 9d.@£11 5s.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of November 21, that the price of silver during the week has been 14.50 reales per oz. Exchange has gone up again, making it 33.82 pesetas to £1. Local quotation for pig lead on wharf has been 60.50 reales per qtl., which, on current exchange, is equal to £10 0s. 4d. per ton, of 2,240 lb., f. o. b. Cartagena. Exports for the week included 317,616 kg. pig lead and 150,000 kg. desilverized to London, 758,965 kg. pig lead and 102,000 kg. desilverized to Marseilles; a total of 1,328,581 kg. In addition, 611 kg. silver went to Marseilles.

Spelter.—The market has been fairly active and quite some business has been done at the lower values established. The closing quotations are given as 4.45@4.47½c. St. Louis, 4.62½@4.65c. New York.

The foreign market is very strong, good ordinaries being quoted at £21, specials at £21 10s. Spot metal is rather scarce.

Silesian Spelter Market.—According to information furnished by Mr. Paul Speier, under date of November 28, the general tendency of the market in November has been firm, with only slight fluctuations. The prices ranged from 405 to 425 marks per 1,000 kg. f. o. b. Breslau, which is equivalent to 4.59 to 4.81c. per lb. The exports from Germany during the month of October were somewhat less than in the corresponding period of the previous year. Business in sheet zinc has been quiet, although it may be noted that the price has raised 1 mark per 100 kg. since the first of October. At the meeting of the sheet zinc manufacturers, early in November, it was decided to dissolve the association on January 1, next, this step being the result of the refusal of the Rhenish-Westphalian manufacturers to limit their output, according to the quota assigned by the association. It is a question what influence the dissolution of the association will have upon future prices. Zinc dust has been in good demand, with inquiries for future deliveries. The prices rule at 40.25@41 marks per 100 kg.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of November 21, that there is no change in the local market, except that prices are somewhat easier.

Antimony is without change. We quote Cookson's at 6¾@7¼c.; Hallett's 6½@6⅝c.; U. S., 6@6¼c.; Italian, Japanese and French at 5⅝@5¾c.

Nickel.—The price is quoted by leading producers at 40c.@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Demand continues steady, and the price remains at $19 per oz.

Messrs. Eimer & Amend, of New York, quote prices for platinum in manufactured forms as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 75c. per gram; platinum crucibles and dishes, 77c. per gram; perforated wire, like cones, Gooch crucibles, etc., 82 per gram.

Quicksilver.—The New York price is $46.50 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

Cadmium.—Herr Paul Speier, writing from Beslau, Germany, reports that the quotation is very firm. The price for metallic cadmium, 99.5%, is 675 marks per 100 kg. delivered in Breslau.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb.		Per lb
No. 1. 99% ingots	33@37c.	Ferro-Tungsten (37%)	38c.
No. 2. 90% ingots	31@34c.	Magnesium, pure (N. Y.)	60c.
Rolled Sheets	4c. up	Manganese	$2.75
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum	33@39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	$2.10	Molybdenum (Best)	$1.82
Chromium, pure (N. Y.)	80c.	Phosphorus, foreign	45c.
Copper, red oxide	50c.	Phosphorus, American	70c.
Ferro-Molybde'm (50%)	$1.25	Sodium metal	50c.
Ferro-Titanium (10%)	90c.	Tungsten (Best)	62c.
Ferro-Titanium (20@25% N. Y.)	55c.		

Variations in price depend chiefly on size of order.

Missouri Zinc Ore Market. Dec. 5.

(From Our Special Correspondent.)

The highest price reported paid for zinc ore was $34 per ton, and the assay basis price ranged from $27 on some low-grade ore to $31 on a choice lot. Following are the shipments of zinc and lead ores from the various camps of the Joplin district for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,348,540	312,700	$43,460
Webb City-Carterville	997,010	231,040	20,465
Alba-Neck	643,810	39,170	10,645
Galena-Empire	483,110	118,730	9,365
Duenweg	242,230	76,160	5,625
Carthage	326,540	....	5,240
Zincite	250,260	8,330	3,970
Granby	229,000	41,000	3,430
Mitchell	167,650	32,190	3,350
Prosperity	78,930	63,070	2,825
Carl Junction	164,280	....	2,710
Spurgeon	60,530	100,770	2,500
Cave Springs	124,640	3,820	1,990
Oronogo	109,930	10,110	1,830
Badger	124,100	....	1,625
Wentworth	41,000	....	575
Totals	6,393,560	1,037,090	$119,605
Forty-nine weeks	446,047,280	54,074,580	$9,015,855

Values: Zinc, the week, $93,230; 49 weeks, $7,560,450; lead, the week, 26,375; 49 weeks, $1,455,395.

At a producers' convention during this week it was decided to restrict the output another week at least, in order to give the smelters an opportunity to take up more of the reserve before the bins are again filled up. At the rate at which the surplus has been reduced in the past two weeks, it would require another three weeks to wipe out the reserve stock entirely. A couple of mines were started during the week, but three or four additional ones were shut down. It is hoped that the restriction of the output may influence an upward tendency of prices; but the principal object is to clean up the reserve stock in the bins, in order to be even with the market situation at the beginning of the year, instead of carrying over upward of 12,000 tons, as was done a year ago.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	30.15	26.32	4.442	4.075	5.349	4.28
April	29.81	27.77	4.567	4.075	5.550	4.37
May	29.51	29.85	4.325	4.075	5.639	4.47
June	28.34	29.36	4.210	4.075	5.697	4.56
July	27.68	28.38	4.075	4.075	5.662	5.27
August	28.29	28.23	4.075	4.075	5.725	5.44
September	26.77	26.60	4.243	4.075	5.686	5.49
October	25.92	26.07	4.375	4.075	5.510	5.38
November	25.42	25.68	4.218	4.075	5.388	5.18
December	.....	25.68	.....	4.075	.....	4.78
Year	.....	26.79	.....	4.069	.....	4.84

NOTE.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.681c.; for March, 5.174c.; for April, 5.375c.; for May, 5.469c.; for June, 5.537c.; for July, 5.507c; August, 5.55c, September 5.514c.; for October, 5.35c; for November, 4.886c.

Average Prices of Copper.

Month.	New York. Electrolytic. 1903.	New York. Electrolytic. 1902.	New York. Lake. 1903.	New York. Lake. 1902.	London. Standard. 1903.	London. Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	55.16
March	14.416	11.882	14.572	12.188	63 85	53.39
April	14.454	11.618	14.642	11.986	61.72	52.79
May	14.435	11.856	14.618	12.226	61.73	54.06
June	13.942	12.110	14.212	12.360	57.30	53.58
July	13.094	11.771	13.341	11.923	58.64	52.89
August	12.962	11.404	13.159	11.649	58.44	51.96
September	13.205	11.480	13.345	11.760	56.82	52.68
October	12.801	11.449	12.954	11.722	55 60	52.18
November	12.617	11.288	12.813	11.553	56.30	51.08
December	.....	11.430	.....	11.599	.....	50.95
Year	.....	11.626	.....	11.887	.....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903. London Pence.	1903. N. Y., Cents.	1902. London. Pence.	1902. N. Y., Cents.	1901. London, Pence.	1901. N. Y., Cents.
January	21.98	45.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	22.49	48.72	25.00	54.23	27.04	60.23
April	23.38	50.56	24.34	53.72	27.30	59.20
May	24.89	54.11	23.71	51.31	27.43	59.64
June	24.29	52.86	24.17	52.36	27.42	59.57
July	24.86	53.92	24.38	52.88	26.96	58.46
August	25.63	55.36	24.23	52.52	26.94	58.37
September	26.75	58.00	23.88	51.52	26.95	58.26
October	27.89	60.36	23.40	50.57	26.62	57.59
November	27.01	58.11	22.70	49.07	26.12	56.64
December	.....	.....	22.21	48.03	25.46	55.10
Year	.....	.....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of company.	Date.	Per share.	Total.	Total to date.
Bunker Hill & Sull	Dec. 4	.10	30,000	1,520,000
†Calumet & Arizona, Ariz.	Dec. 20	2.00	400,000	400,000
†Calumet & Hecla Copper	Dec. 22	10.00	1,000,000	88,350,000
*Central Lead, Mo	Dec. 15	.50	5,000	385,000
Col. & Hock. C. & I	Feb. 15	.25	17,311	103,842
*Daly-West, Utah	Dec. 15	.65	117,000	3,591,000
†Federal Mg. & Sm., pf	Dec. 15	1.75	183,750	183,750
Granby Con., B. C	Dec. 18	.10	133,630	133,630
‡Maryland Coal, pf	Dec. 31	2.50	47,125	1,046,135
Maryland Coal, extra	Dec. 31	2.50	47,125	.....
Montana-Tonopah, Nev	Dec. 20	.05	50,000	50,000
†National Lead, pf	Dec. 15	1.75	260,820	13,972,168
*San Rafael, Aviador, Mex.	Dec. 20	20.64	24,768	.....
*San Rafael, Aviado	Dec. 20	10.32	12,384	.....
*St. Joseph Lead, Mo	Dec. 15	.15	56,250	3,834,500
*Soledad, Aviada, Mex	Dec. 20	8.66	8,256	264,712
†Standard Oil	Dec. 15	12.00	11,640,000	206,715,000
†U. S. Steel, com	Dec. 30	.50	2.541,513	53,350,978

*Monthly. †Quarterly. ‡Semi-annually.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
American Quartz	Cal.	..	Dec. 23	.....	$0.25
Calodonia	Nev.	..	Dec. 31	Jan. 20	.15
Caribou Oil	Cal.	..	Jan. 4	.....	.10
Champion	Cal.	..	Dec. 15	.....	.20
Chollar	Nev.	64	Dec. 10	Dec. 31	.10
Con. New York	Nev.	19	Dec. 1	Dec. 23	.10
Dexter-Tuscarora	Nev.	2	Dec. 21	Jan. 8	.02
Elephant	Utah	..	Dec. 1	Dec. 21	.01
Exchequer	Nev.	43	Dec. 14	Jan. 4	.05
Hale & Norcross	Nev.	..	Dec. 31	.....	.10
La Palma	Mex.	..	Dec. 28	.....	.06
Little Bell Con	Utah	1	Dec. 19	Jan. 5	.10
Mexican	Nev.	76	Dec. 17	Jan. 7	.10
New Almaden Quicksilver	Mex.	..	Dec. 28	.....	.00½
Overman	Nev.	..	Dec. 15	Jan. 5	.10
Park City Superior	Utah	..	Dec. 7	Dec. 24	.00⅛
Potosi	Nev.	68	Dec. 8	Dec. 29	.10
Red Slide	Cal	..	Dec. 26	.....	.05
Savage	Nev.	111	Dec. 8	Dec. 29	.10
Sierra Nevada	Nev.	131	Dec. 8	Dec. 28	.10
Tonopah & Salt Lake	Nev.	2	Nov. 26	Dec. 18	.10

STOCK QUOTATIONS

NEW YORK.

Company and Location.	Par val	Shares Listed.	Dec. 2 H.	Dec. 2 L.	Dec. 3 H.	Dec. 3 L.	Dec. 4 H.	Dec. 4 L.	Dec. 5 H.	Dec. 5 L.	Dec. 7 H.	Dec. 7 L.	Dec. 8. H.	Dec. 8. L.	Sales.
Acacia Colo., g..	1	1,500,000	....	....	....	....	....	....	.06	.05½	....	....	....	....	1,000
Alamo, Utah	1	125,000	....	....	.01	....	....	....	....	....	....	....	....	....	1,500
Alice, Mont.	25	400,000	....	....	.17	....	....	....	....	....	....	....	....	....	100
Alta, Nev.	1	108,000	....	....	....	....	....	....	....	....	....	....	.04	....	300
Amalgamated Mont c.	100	1,538,879	40⅞	38⅞	41¾	40½	42⅜	41⅛	41⅝	41⅛	46¾	41¾	47⅜	43⅞	497,980
Anaconda Mont	25	1,200,000	70	64¼	69	68½	72	70	....	....	77	71	80	77	8,080
Best & Belcher, Nev.,s	25	200,000	....	....	2.05	2.00	....	....	....	....	2.15	....	....	....	300
Brunswick,Con.Cal. g	5	100,000	....	....	.04	....	....	....	....	....	2.15	....	....	....	2,000
Caledonia, Nev., s	1	100,000	....	....	1.10	....	1.00	....	....	....	....	....	.90	....	500
Chollar, Nev., s., g	2½	112,000	.30	....	....	....	....	....	....	....	....	....	....	....	500
C. K. & N., Colo.	1	1,590,000	18½	....	....	....	....	....	....	....	....	....	....	....	1,000
Confidence, Nev.	3	24,960	....	....	.85	....	....	....	....	....	....	....	....	....	100
Con.Cal.&Va.,Nev.,g.s	2½	216,000	1.35	....	1.30	....	1.20	....	1.15	1.10	....	....	1.10	....	1,500
Con. Imperial, Colo.	1	500,000	05½	....	....	....	05	....	....	....	....	....	05	....	3,100
Crede & Grip. Ck. Colo	1	800,000	....	....	01½	....	....	....	....	....	....	....	....	....	1,000
Elkton, Colo., g.	1	1,250,000	.41	....	....	....	....	....	.41	....	....	....	.43	.42	1,200
El Paso, Colo., g.	1	650,000	....	....	....	....	....	....	....	....	50	....	....	....	500
Eureka, Nev.	20	50,000	....	....	....	....	....	....	50	....	....	....	....	....	100
Golden Fleece,Colo.,g	1	600,000	06	....	....	....	....	....	....	....	....	....	....	....	500
Gould & Curry, Nev.	1	108,000	....	....	.40	....	....	....	....	....	....	....	....	....	400
Greene Con., Mex., c.	10	720,000	11½	10¾	12¾	11¼	12¾	12⅜	12½	12¼	13⅛	12¼	14	13¼	58,960
Hale & Norcross, Nev.	100	112,000	60	....	....	....	....	....	....	....	53	51	59	....	900
Homestake , S. D.,g..	100	218,400	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver, Utah	20	400,000	1.05	....	....	....	....	....	....	....	....	....	....	....	100
Iron Silver, Colo.	20	400,000	2.00	....	....	....	....	....	2.00	....	....	....	....	....	150
Isabella, Colo., g.	20	500,000	....	....	....	....	08½	....	....	....	07½	....	08	....	2,500
Justice, Nev.	2	105,000	....	....	.15	....	.13	....	....	....	....	....	....	....	700
Leadville, Colo.	10	400,000	....	....	....	....	....	....	.04	....	....	....	....	....	1,000
Little Chief, Colo.	50	200,000	....	....	....	....	....	....	....	....	....	....	08	....	300
Mexican, Nev., s.	3	100,800	1.30	....	1.25	....	....	....	1.20	....	....	....	1.00	....	900
Mollie Gibson, Colo.,g	5	1,000,000	....	....	.07½	.07	.07½	....	....	....	....	....	07	06½	2,000
Moon Anchor, Colo.,g	5	400,000	....	....	....	....	....	....	09	....	....	....	....	....	500
Phœnix, Ariz.	1	....	....	....	....	....	....	....	....	....	....	....	06	05	500
Occidental, Nev., s.	3	100,000	....	....	....	....	.50	....	.46	....	....	....	....	....	500
Old Gold, Colo.	1	1,000,000	....	....	....	....	....	....	.08	....	....	....	....	....	2,000
Ontario, Utah	100	150,000	....	....	3.05	....	....	....	....	....	....	....	....	....	900
Ophir, Nev., s.	3	100,800	2.05	....	1.35	....	2.00	....	....	....	2.00	....	....	....	20
Overman, Nev.	2	115,200	.26	....	....	....	....	....	....	....	....	....	....	....	900
Pharmacist, Colo.	1	1,500,000	.02	....	....	....	....	....	....	....	....	....	....	....	300
Portland, Colo., g.	1	3,000,000	....	....	....	....	....	....	.95	....	....	....	1.10	....	1,000
Potosi, Nev. s.	1	112,000	.30	.28	....	....	....	....	....	....	.24	....	....	....	600
Quicksilver, Cal	100	500,000	....	....	....	....	....	....	....	....	.200	....	....	....	900
Quicksilver Pf.	100	43,000	....	....	5.50	....	....	....	....	....	....	....	....	....	100
Savage, Nev.	3	112,000	.55	.45	....	....	....	....	....	....	.65	....	....	....	100
Sierra-Nevada, Nev.	3	100,000	....	....	....	....	.55	....	....	....	....	....	....	....	700
Silver Hill, Nev.	1	100,000	.65	....	....	....	....	....	.08	....	....	....	1.75	....	300
Syndicate, Cal.	1	100,000	....	....	....	....	....	....	.04	....	....	....	....	....	800
Tenn., Tenn., c.	25	175,000	.30	28½	.30	29¾	29⅜	29⅜	30	....	29¾	29½	.30	29⅝	1,000
Union Con., Nev., g. s	1	100,000	.85	.69	....	....	....	....	....	....	....	....	....	....	4,530
Union Copper, N. C...	25	750,000	½	....	½	....	½	....	½	....	⅝	....	⅝	1/16	300
United, Mont.,com., c	100	300,000	....	....	....	....	....	....	....	....	....	....	....	....	1,840
White Knob, Idaho, c.	10	200,000	9¾	9½	10	9½	9⅝	9½	6⅞	....	....	....	9¾	9	7,250
Work.	1	1,600,000	....	....	....	....	....	....	....	....	01½	....	....	....	....

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 611,340 shares. † Ex-dividend. *Per Cent.

COLORADO SPRINGS (By Telegraph).

Name of Company.	Dec. 7. H.	Dec. 7. L.	Dec. 8. H.	Dec. 8. L.	Name of Company.	Dec. 7. H.	Dec. 7. L.	Dec. 8 H.	Dec. 8 L.
Acacia	.05½	.05	.05½	.05	Jack Pot	.05	.03	.05	.03
Am. Con.	.03	.02⅛	.03	.02⅛	Keystone	.03	.02⅛	.02½	.02
Anaconda	.12	.10	.12	.10	Last Dollar	.48	.35	.48	.35
Colo. City & Manitou	....	....	....	....	Lexington	.03⅛	.03	.03⅛	.03⅜
Cripple Creek Con	.03	.02⅛	.02⅛	.02¼	Little Puck	.02⅛	.01	.02⅛	.01
C. K. & N.	.15¾	.12½	.14	.10	Mollie Gibson	.06	.05⅛	.06	.05⅛
Doctor-Jack Pot	.04½	.04⅛	.06	.05¾	Moon Anchor	.10	.09	.10	.09⅛
Elkton Con	.45¼	.45	.46	.45¼	New Haven	.02⅛	.02⅛	.02½	.02⅛
El Paso	.50	.48	.50	.48	Old Gold	.09⅜	.09	.06⅜	.09
Gold Dollar Con	.02⅛	.02¼	.02⅛	.02¾	Pharmacist	.02½	.02¼	.02½	.02⅛
Golden Cycle	.63	.55	.63	.55	Pinnacle	....	....	....	....
Golden Fleece	.06	.04	.06	.04	Portland	1.03	1.00	1.10	1.00
Gold Soverign	.02⅛	.02¾	.02⅛	.02¾	Vindicator	.85	.40	85	.40
Isabella	.07½	.07¼	.07¾	.07¼	Work	.04	.03¼	.04	.03¾

COLORADO SPRINGS, COLO.*

† Name of Company.	Par Val	Shares Listed.	Nov. 28 H.	Nov. 28 L.	Nov. 30 H.	Nov. 30 L.	Dec 1. H.	Dec 1. L.	Dec. 2. H.	Dec. 2. L.	Dec. 3, H.	Dec. 3, L.	Dec. 4. H.	Dec. 4. L.	Sales
Acacia	$1	1,500,000	.06¼	.05	.06	.05	.06	.05	.06	.05	.05½	.05	.05	....	1,000
American Con	1	2,000,000	.02	....	.02	....	.02	.02	....	....	.02	....	.02	....	....
Anaconda	5	1,000,000	.11	.09	.12	....	.10½	.09½	.12	.10	.12	.10	.12	.09½	1,000
Colo. City & Manitou	1	1,000,000	.02	....	.02	....	.02	.01	.02	....	.01½	....	.01	....	1,000
C. K. & N.	1	1,250,000	.18	....	.18½	.16¾	.18	.17	.17½	.14½	.17½	.14⅝	.17¼	.14	1,000
Cripple Creek Con	1	2,000,000	.03	.02⅝	.02½	....	.03	.02⅛	.02⅜	.02½	.03	.02½	.03	.02½	....
Des Moines	1	750,000	.02	.01¾	.02	.01¼	.02	.01	....	....	.02	.01⅜	.02	.01¼	....
Doctor Jack Pot	1	2,900,000	.06⅛	.04½	.06¼	....	.05¾	.04¾	.06	.04	.06½	.04	.06	.04	2,000
Elkton Con	1	1,250,000	.43½	.43	.45	.43	.46	.43½	.45	.43½	.45	.43⅜	.46	.44½	2,086
El Paso	1	900,000	.50	....	.50	....	.50	.48	.50	.48	.50	.47½	.47½	....	7,750
Findley	1	1,250,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Dollar Con	1	500,000	.03	.02¾	.03	.02¾	.02⅞	.02⅝	.03	.02¾	.03	.02¾	.03	.02¾	3,000
Gold Sovereign	1	1,000,000	.03	.02⅞	.03	.02⅞	.03	.02¾	.03	.02¾	.03	.02¾	.03	.02¾	6,000
Golden Cycle	1	2,000,000	.63	.58	.58	....	.63	.58	.64	.58	.63	.68	.60	....	5,000
Golden Fleece	1	600,000	.04	....	.06	....	.06	....	.06	....	.06	....	.06	....	5,000
Gould	1	1,250,000	.005	....	.005	.001	.005	.001	.005	....	.0005	.002	.002	.004	4,000
Hart	1	1,000,000	.03	....	.03	....	.03	....	.03	....	.02½	....	.02½	....	....
Isabella	1	3,000,000	.06¾	....	.07⅜	.07	.07½	.07¼	.07½	.07⅜	.07⅜	.07	.07⅜	.07	5,500
Jack Pot	1	1,250,000	.06	....	.06	....	.03	....	.10	.07	.06	....	.06	....	....
Keystone	1	1,500,000	.03	.02	.04	.02½	.03½	.02½	.02	....	.03	.02½	.02½	....	2,500
Last Dollar	1	1,500,000	.49	....	.45	....	.48	....	.48	....	.48	....	.48	....	....
Lexington	1	1,500,000	.03¼	....	.03¼	....	.03⅝	.03⅜	.03¼	....	.03¾	.03⅜	.03⅝	.03⅜	4,000
Little Puck	1	2,000,000	.02⅛	....	.02¼	.01	.01¼	....	.02	....	.02½	....	.02⅛	....	....
Mollie Gibson	5	1,000,000	.03	....	.05	....	.06¾	.05¼	.06½	.05	.06½	.05	.05½	.06	1,000
Moon-Anchor	5	400,000	.11	.09	.11	.09	.11	.09	.11	.09	.02¾	.02¾	.09	.10½	....
New Haven	1	1,500,000	.02¼	.02	.02½	.02	.02½	.02½	.02⅛	....	.02½	....	.02⅛	....	3,000
Old Gold	1	1,800,000	.09¾	.09½	.10	.03½	.09½	.09⅜	.09½	.09¼	.09½	.09¼	.09¼	.09½	19,000
Pharmacist, Con	1	1,500,000	.02¼	....	.02¼	....	.02½	.02⅜	.02¼	....	....	....	.02½	.02¼	6,000
Pinnacle	1	2,000,000	.03	....	.03	....	.03	....	.02½	....	.03	....	.03	....	....
Portland	1	3,000,000	....	....	....	....	1.10	1.00	1.00	....	1.25	100½	1.15	1.08¼	500
Vindicator Con.	1	1,500,000	.85	....	.80	....	.85	....	.85	....	.85	....	.85	....	....
Work	1	1,500,000	.04	.03½	.04	.03½	.04	.93⅝	.04	.03½	.04	.03½	.04	.03½	6,500

Colo. Springs Mining Stock Exchange. †All gold mines in Colorado. Total sales. 94,836 shares.

SAN FRANCISCO (By Telegraph).

Name of Company.	Shares Issued.	Dec. 7 30.	Dec. 8 1.	Name of Company.	Shares Issued.	Dec. 7 30.	Dec. 8 1.
Belcher	104,000	.24	.23	Justice	105,000	.12	.09
Best & Belcher	100,800	2.20	2.00	Mexican	100,800	.93	.90
Caledonia	100,000	.83	.84	Occidental Con	100,000	.49	.45
Challenge Con	50,000	.22	.21	Ophir	100,800	1.90	1.85
Chollar	112,000	.21	.20	Overman	115,200	.13	.13
Confidence	24,960	.83	.80	Potosi	112,000	.21	.19
Con. California & Virginia	216,000	1.00	1.00	Savage	112,000	.44	.40
Con. Imperial	500,000	.03	.03	Sierra Nevada	100,000	.50	.46
Crown Point	100,000	.18	1/16	Union Con	100,000	.55	.50
Gould & Curry	108,000	.38	.35	Utah Con	100,000	.15	.12
Hale & Norcross	112,000	.48	.47	Yellow Jacket	120,000	.24	.24

COAL, IRON AND INDUSTRIAL STOCKS.

Name of Company.	Par val.	Shares Issued.	Dec. 2 H.	Dec. 2 L.	Dec. 3 H.	Dec. 3 L.	Dec. 4 H.	Dec. 4 L.	Dec. 5 H.	Dec. 5 L.	Dec. 7 H.	Dec. 7 L.	Dec. 8 H.	Dec. 8 L.	Sales
Allis-Chalmers	$100	200,000	....	....	....	....	....	....	....	....	7	....	....	....	200
Allis-Cham's, pf	100	162,500	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Agr. Chem	100	172,156	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Agr. Chem. pf.	100	181,350	....	....	....	....	....	....	....	....	....	....	....	....	10
Am. Sm. & Ref.	100	500,000	46	44¾	47	46	47	46½	46¾	45¾	48½	46¾	51	49½	46,145
Am.Sm. & Ref.,pf	100	500,000	88	86	88⅞	87½	89⅛	88¾	90	89⅛	90	....	91	90⅜	5,364
Am. Steel Fdy	100	200,000	....	....	....	....	3½	....	....	....	....	....	....	....	33
Am. S. & Fdy., pf	100	200,000	33¾	....	....	....	38	....	....	....	....	....	....	....	55
Col. Fuel & I., Colo.	100	239,310	23	24⅝	29	26¾	29	28¼	28½	26	28¾	....	28½	26	6,480
Col. & H. C. & I., Colo.	100	69,244	....	....	11¾	11	....	....	11½	....	11⅜	11	11⅜	11¼	1,000
Crucible Steel	100	250,000	....	....	4	....	4⅛	4	4⅛	3⅞	4½	4⅛	4½	....	1,825
Crucible Steel,pf.	100	250,000	....	....	30	....	30⅜	30	31	29⅞	31	30½	31	30¾	1,844
General Chemical	100	74,100	....	....	....	....	....	....	....	....	....	....	....	....	....
General Chemical, pf.	100	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Mong. R. Coal, Pa.	50	200,000	....	....	....	....	....	....	28	27	28	....	29	....	310
Mong. R. Coal, pf, Pa.	50	97,300	27	....	....	....	....	....	....	....	....	....	....	....	....
National Lead	100	149,054	13½	....	14	13¾	14¾	....	....	....	14	13¾	17¼	14½	7,320
National Lead, pf	100	149,040	80	79½	80	....	....	....	....	....	....	....	80	....	500
Phila. Nat. Gas	100	308,542	39½	....	....	....	....	....	....	....	38½	....	39¾	....	470
Phila. Nat. Gas, pf.	100	212,873	....	....	....	....	....	....	....	....	....	....	....	....	....
Pittsburg Coal, Pa.	100	300,307	5	....	18⅝	18½	18⅝	....	18¾	18½	18⅝	15½	....	....	2,045
Pittsburg Coal,pf.	100	297,012	60¾	60½	60½	60	61	60½	61	60½	61	60⅜	....	....	2,613
Republic I. & S.	100	273,560	6¾	6	6⅞	6¾	7⅜	7	7⅜	7	7¼	....	7¼	....	4,300
Republic I. & S., pf.	100	204,189	39¾	38¾	42	39¼	43¼	42	42	41½	42½	41¾	43	42¼	10,500
Sloss-Shef S. & I., Ala.	100	75,000	....	....	26½	25	30¾	27½	....	....	....	....	29¼	29	30	29⅛	2,275
Sloss-Shef S.&I.pf,Ala	100	65,085	....	....	70	....	....	....	....	....	....	....	72	....	....	....	200
Standard Oil	100	970,000	....	....	645	....	650	648	649	648	648	....	655	650	142
Tenn. C.I. & R.R	100	225,000	29¾	29¼	32½	30	34½	32¾	33¼	42	33½	32	34½	33	24,519
U.S. Red. & Ref.	100	59,188	....	....	....	....	....	....	....	....	....	....	....	....	....
U. S. Red & Ref., pf.	100	39,458	....	....	....	....	....	....	....	....	....	....	....	....	....
‡U.S.Steel Corp.	100	5,084,952	11½	11	11⅞	11	12½	11¾	12	11¼	12	11⅜	12⅜	11⅞	98,775
U. S. Steel Corp. pf.	100	5,103,141	53⅜	52⅜	54⅞	52¾	58	54¾	57	55⅝	57½	55⅝	59	57½	627,573
Va.-Car Chem.	100	279,844	20⅝	20½	21	20½	21½	21	21¼	....	21½	21⅜	22½	21⅝	4,310
Va.-Car Chem.,pf.	100	120,000	....	....	....	....	89	....	....	....	....	....	91	....	100
Va. I., Coal & Coke	100	86,416	....	....	....	....	....	....	....	....	....	....	....	....	....

†Ex-dividend Total sales, 850,789 shares.

BOSTON, MASS.

Name of Company.	Par val	Shares listed	Dec. 2 H.	Dec. 2 L.	Dec. 3 H.	Dec. 3 L.	Dec .4 H.	Dec .4 L.	Dec. 5 H.	Dec. 5 L.	Dec. 7 H.	Dec. 7 L.	Dec. 8 H.	Dec. 8 L.	Sales.
Adventure Con., c.	$25	100,000	....	....	3½	3¼	....	....	3½	....	3½	3	3½	3	1,535
Allouez, c.	25	99,511	....	....	4½	....	5	4¾	....	....	4¾	4¼	5	4¾	812
Amalgamated, c.	100	1,538,879	40⅞	39	41⅞	40½	42¾	41¼	41⅝	41	46¾	41⅝	47⅜	44⅛	69,545
Am. Gold Dredging.	5	90,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Zinc, Lead & Sm.	25	60,000	10½	10	11½	10½	11	....	....	....	....	....	11	....	965
Anaconda, c. s.	25	1,200,000	....	....	....	....	....	....	....	....	18	....	....	....	50
Arcadian, c.	25	150,000	....	....	....	....	....	....	....	....	....	....	.87½	.80	175
Arnold, c.	25	60,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic, c.	25	100,000	....	....	....	....	....	....	....	....	8	7½	8½	8	335
Bingham Con. g. s.	50	150,000	20½	20	21¾	20½	21⅝	21¼	21½	21	22	21	22⅜	22	4,080
Bonanza Dev. g.	10	300,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Breece, s. l.	25	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
British Columbia, c.	5	256,800	....	....	....	....	....	....	....	....	....	....	....	....	....
Calumet & Hecla, c.	25	100,000	....	....	....	....	....	....	....	....	....	....	440	435	89
Centennial, c.	25	90,000	15¼	14⅜	15⅞	15	16	15¾	....	....	16½	16	17¼	16¼	3,128
Central Oil	25	60,050	....	....	....	....	6	....	6	....	....	....	....	....	50
Con. Mercur, g.	5	1,000,000	.95	....	....	....	90	....	....	....	.1	.95	.95	.90	2,540
Copper Range Con.	100	379,846	44	42¼	44	43¼	46	44	45¼	43¾	46	44¼	48	45½	34,478
†Daly West, g. s. l.	20	180,000	....	....	36	....	36	....	36	....	36	....	36½	36	831
Dominion Coal	100	150,000	....	....	72½	72¼	75½	74	73½	75½	78	76¾	78	76	1,030
Dominion Coal, pf.	100	30,000	....	....	....	....	....	....	....	....	....	....	112¼	1.12	20
Dominion I. & S.	100	100,000	....	....	8¼	....	8½	8	8½	....	9	8½	9	8¾	975
Elm River, c.	12	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Franklin, c.	25	100,000	....	....	....	....	7¾	7½	....	....	7½	....	7¾	7½	354
Granby Con. g. s. c.	10	1,336,303	....	....	4 1/16	4 1/16	....	....	....	....	....	....	4	....	650
Guanajuato Con. g.	5	385,000	....	....	....	....	....	....	....	....	.75	....	.50	....	200
Isle Royal Con., c.	25	385,000	6¾	6½	7	6¾	7	....	7	....	8	7	8	7¾	1,467
Mass Con., c.	25	100,000	....	....	4¼	....	4½	....	....	....	4	....	....	....	160
Mayflower, c.	25	100,000	....	....	....	....	....	....	....	....	1	.50	.75	....	916
Michigan, c.	25	100,000	....	....	....	....	....	....	....	....	6¾	6½	6	....	90
Mohawk, c.	25	100,000	37½	33	37½	37	38	37	....	....	38½	37	38½	37½	2,475
Mont. Coal & Coke.	25	200,000	....	....	....	....	....	....	....	....	3¼	....	3¾	3½	660
Mont'l & Boston, c.	5	570,000	....	....	....	....	....	....	....	....	....	....	....	....	....
New Odria, q.	5	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Nova Scotia St. & C.	100	37,623	....	....	....	....	....	....	....	....	....	....	....	....	10
Nova Scotia St.&C., pf.	100	10,300	....	....	....	....	....	....	....	....	....	....	....	....	....
Old Colony, c.	25	100,000	....	....	....	....	....	....	....	....	1¼	....	1¼	....	300
Old Dominion, c.	25	150,000	....	....	....	....	....	....	....	9¼	....	....	....	....	5
Osceola, c.	25	96,150	57½	56½	....	....	59½	58	59	....	62	58½	62	60½	2,212
Parrot, s. c.	10	229,850	18	17¼	18	....	19	....	....	....	20½	19½	21½	21	1,516
Phœnix Con, c.	25	100,000	....	....	....	....	....	....	....	....	3¼	....	3½	3¼	190
Quincy, c.	25	100,000	82½	....	85	84	85	....	....	....	85	....	90	85	152
Rhode Island, c.	25	100,000	....	....	1	....	....	....	....	....	1	....	1¼	1	122
Santa Fe, g. c.	10	250,000	....	....	....	....	....	....	....	....	2	....	....	....	200
Shannon, c.	10	298,913	8	7½	7½	7	7½	7	7½	7	8½	7¾	8½	7¾	5,085
Tecumseh, c.	25	80,000	....	....	....	....	....	....	....	....	95	90	95	84	196
Tennessee, c.	25	175,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Trinity, c.	25	160,000	5	....	5	....	5	....	....	....	5	....	5¼	5	1,575
United c.	100	450,000	....	....	....	....	....	....	....	....	....	....	....	....	....
United States, g.	10	300,000	18	17½	18¾	18	18⅜	18	18¾	18⅜	19	18½	19¼	18⅜	6,220
U. S. Coal & Oil.	25	240,000	9	8½	9	8½	9	....	9	....	8⅝	....	8¾	8½	605
Utah Con., g. c.	5	231,086	27½	27	28⅜	27½	28½	28	28¼	28	29	28¼	30½	28¾	15,188
Victoria, c.	25	100,000	2⅞	....	....	....	....	....	....	....	2¼	2¼	2½	....	830
Winona, c.	25	100,000	7⅝	7½	....	....	8	7¾	....	....	8¾	7⅝	8½	8	1,273
Wolverine, c.	25	60,000	67	....	....	....	66	....	66¼	....	67	....	1	....	124
Wyandot, c.	25	100,000	....	....	93¼	....	....	....	87½	....	....	....	....	....	280

†Ex-dividend. ‡Assessment Paid. Total sales, 163,680 shares.
c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver.

SAN FRANCISCO.*

Name of Company.	Location.	Capitalization.	Nov. 27 H.	Nov. 27 L.	Nov. 28 H.	Nov. 28 L.	Nov. 30 H.	Nov. 30 L.	Dec. 1 H.	Dec. 1 L.	Dec. 3 H.	Dec. 3 L.	Dec. 4 H.	Dec. 4 L.	Sales
Bru'w'k Con. M.G. Co.	Cal.	500,000	....	....	....	....	....	....	85	....	.05	....	....	....	2,000
Central Eureka g.	Cal.	400,000	....	....	....	....	....	....	....	....	....	....	....	....	214
Draper Gold Mg. Co.	Cal.	500,000	.14	....	.14	....	....	....	....	....	....	....	....	....	700
Esperanza g.	Nev.	750,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Gipsy Queen	Nev.	1,000,000	.25	....	....	....	....	....	.

STOCK QUOTATIONS

MEXICO.* Nov. 27

Name of Company.	Shares Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Durango:				
Ca. Min. de Penoles..	2,500	$50.00	$3,800	$4,100
San Andres de la Sierra	200	.....	10,000	.....
Guanajuato:				
Angustias, Pozos....	2,400	5.00	55	60
Cinco Senores y An., aviadoras	2,000	15.00	70	75
Cinco Senores y An., aviada	400	10.00	65	70
Providencia, San Juan de la Luz	6,000	2.00	80	85
Queensland y Australia	300	.....	60	70
Guerrero:				
Delfina, 1st serie.....	2,500	.....	35	40
Delfina, 2nd serie....	2,500	.....	30	40
Garduno y Anexas...	7,200	.....	40	50
Hidalgo:				
Amistad y Condordia	9,600	8.87	81	83
Carmen, aviada.....	1,100	.....	.....	100
Guadalupe Fresnillo Mill	1,000	.....	160	250
Guadalupe Fresnillo Mine	1,400	.....	70	80
La Blanca, aviadora.	1,536	.....	.....	.....
La Blanca, aviada....	768	.....	.....	.....
La Reina y An., aviadora	5,600	.....	19	21
Luz de Maravillas, aviadas	1,100	.....	.....	20
Maravillas y An., aviador.	1,680	.....	120	140
Maravillas el Lobo ..	1,000	.....	130	180
Palma y An., aviador.	1,800	.....	.....	12
Real del Monte	2,554	10.00	.....	.....
Refugio, aviada.....	12,800	.....	5	7
Santa Anay An., aviadora	1,800	.....	35	40
Santa Anay An., aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,600	.....	13	15
Sta. Gertrudis y An., aviadora	28,800	1.00	81	83
Santo Tomas Apostol aviadoras	5,100	.....	2	3
San Felipe de Jesus, aviadora	3,600	.....	17	19
San Felipe de Jesus, aviada	1,200	.....	6	10
San Rafael y An., Trompillo.	1,200	12.00	1,690	1,700
San Rafael y An., aviada.	1,200	4.00	680	700
Soledad, aviada.....	960	5.00	680	700
Sorpresa, aviada. ...	960	5.00	340	350
.....	.....	.....	.....	.....

Name of Company.	Shares Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Mexico:				
Alacran.....	2,400	.....	40	50
Aldebarren.....	2,000	.....	55	80
Buen Despacho.....	3,000	.....	60	60
Dos Estrellas.....	3,000	30.00	2,100	2,127
La Esperanza (El Oro.).....	3,000	10.00	1,500	1,500
La Reformia, aviadores.....	2,000	.....	6	40
Providencia, pagadoras.....	1,600	.....	.....	.....
Providencia, liberadas.....	800	.....	.....	.....
Santa Ana, Esperanza.....	2,400	.....	90	.....
Michoacan:				
Luz de Borda, aviadora.....	3,000	.....	120	130
Luz de Borda, aviado.....	1,000	.....	40	48
Santiago y An., Tlal..	4,000	.....	12	15
Nuevo Leon;				
La Fraternal.....	1,000	.....	580	620
Norias de Bajan.....	1,000	.....	880	920
San Luis Potosi:				
Concepcion y An.....	3,000	.....	60	95
El Barreno, aviadora.	2,000	2.00	52	54
Sta. Maria de la Paz..	2,400	20.00	210	212
San Diegoy Annexas.	2,400	4.00	8	10
Zacatecas:				
Asturiana y An.....	2,500	.....	70	80
Candelaria y Pinos..	2,500	10.00	140	150
Cubiertas.....	2,400	.....	.....	.....
Esperanza y An.....	2,400	.....	6	8
Lourdes.....	2,500	.....	30	40
Luz de Minillas, pagadoras.	2,000	.....	15	30
Nueva Quebradilla, aviadoras.	2,400	.....	100	105
Nueva Quebradilla, aviadas.....	600	.....	70	80
San Carlos y Annexas	2,500	20.00	140	150
Sta. Maria de Gaud..	2,500	10.00	55	60
Miscellaneous:				
Bartolome de Medina	2,000	1.50	76	80
Guadalupe Hacienda	20,000	6.00	.....	.....
La Luz Hac. (Pachuca.).....	3,750	.....	.....	.....
La Reina (Chihuahua.).....	192	.....	.....	.....
Naica (Chihuahua.)..	100	.....	11,000	13,000
Natividad (Oaxaca) aviadora.....	1,800	10.00	1,000	1,050
Natividad (Oaxaca) aviadas.....	600	4.00	.....	.....
San Francisco Hac...	6,000	1.00	65	70
Santa Ana Huantia Morelos.....	4,000	.....	.....	.....
Union Hacienda.....	3,000	5.00	210	230

*Values are in Mexican currency.

TORONTO, ONT. Dec. 5

Name of Company.	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail, g.....	$1	.04	.02	.....
Cariboo-McKinney, g.	1	.10	.09	.....
Cariboo Hydraulic, g.	1	.75	.....	.....
Center Star, g. s.....	1	.24	.21½	10,000
Crows Nest, Coal & C.	100	2.60	2.00	.....
Dominion Coal, com..	100	.80	.71½	.....
Dominion S. & I.....	100	.09	.08¼	.....
Fairview, g. s.....	1	.05	.03	.....
Giant, g. s.....	1	.02½	.01½	.....
Deer Trail, g. s.....	1	.02½	.01	.....
Iron Mask, g. s.....	1	.06	.....	.....
Morrison, g. s.....	1	.04	.02	.....
.....	.....	.....	.....	.....

Name of Company.	Par val	Prices. High.	Prices. Low.	Sales.
Granby Smelter.....	$10	4.60	4.00	.....
Mountain Lion, g.....	1	.25	.15	.....
North Star, g. s.....	1	.11	.08	.....
Nova Scotia Steel, com	100	.....	.....	.....
Payne, s. l.....	1	.15	.12½	.....
Rambler Cariboo, g..	1	.35	.25	.....
Republic, g.....	1	.02	.....	.....
St. Eugene, g. s.....	1	.46	.36	.....
Virtue, g. s.....	1	.07	.06	.....
War Eagle Con., g. s..	1	.12	.08	.....
Sullivan, g. s.....	1	.06	.04	.....
Winnipeg, g. s..	1	.05½	.04	.....
Wonderful, g. s	1	.04	.....	.....

g—Gold. l—Lead. s—Silver. Total Sales, 45

SALT LAKE CITY.* Dec. 5

Name of Company	Par Val	Shares.	High	Low	Sales.
Ajax	10	300,000	.05	.05	1,500
Bullion-Beck.....	.....	.....	1 50	1.50	100
Butler Liberal.....	.....	500,000	.11¾	.09¾	35,575
Carisa	1	300,000	.10	.09½	3,000
Ce tury.....	.....	.....	.70	.65	2,900
Con. Mercur...	5	1,000,000	.97	.86½	2,100
Daly-Judge	20	300,000	8.00	7.50	3,525
Daly West.....	20	180,000	35.50	35.10	274
Grand Central.	1	250,000	.....	.....	.....
Ingot	½	500,000	.02	.02	5,000
Joe Bowers.....	.....	.....	.....	.....	.....
Keystone.....	1	500,000	.....	.....	.....
La Reine.....	1	800,000	.02½	.02¼	2,000
Little Chief....	10	490,000	.....	.....	.....
L. Mammoth..	1	150,000	.38	.37¾	1,200
Manhattan.....	10	1,000,000	.00½	00	2,000

Name of Company	Par Val	Shares	High	Low	Sales.
May Day.....	¼	400,000	.08¾	.07	32,620
M. Washington	½	300,000	.01⅞	.01¼	11,100
Naildriver	2	300,000	.50	.48	250
N. Y. Bonanza.	1	300,000	.14½	.14	2,765
Northern Light	5	400,000	.....	.....	.....
Richm'd Ancda	.....	.....	.....	.....	.....
Sacramento...	5	1,000,000	.24	.23½	3,500
Silver Shield...	20	800,000	.....	.....	.....
So. Swansea....	1	330,000	.....	.....	.....
Star Con.....	1	400,000	.21½	.20	8,500
Tetro.....	1	300,000	.28	.28	3,000
Uncle Sam Con.	1	500,000	.24½	.24	6,600
Valeo.....	.....	.....	.....	.....	.....
Victor Con.....	1	500,000	.05	.05	100
Wabash	1	500,000	.06	.05	1,100
Yankee Cons...	1	500,000	.39¼	.36	1,800

*By our Special Correspondent. All mines are in Utah. Total sales, 131,109 shares.

PHILADELPHIA, PA *

Name and Location of Co.	Par val.	Dec. 2 H.	Dec. 2 L.	Dec. 3 H.	Dec. 3 L.	Dec. 4 H.	Dec. 4 L.	Dec. 5 H.	Dec. 5 L.	Dec. 7 H.	Dec. 7 L.	Dec. 8. H.	Dec. 8. L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	1 1/16	.....	.....	.....	100
Am. Cement...	10	.....	.....	6¾	.....	6⅞	6¾	.....	.....	6⅞	.....	6⅞	.....	620
CambriaIron, Pa	50	46½	.....	.....	.....	46½	.....	47¼	.....	46½	.....	.....	.....	19
Cambria St., Pa	50	18	17⅞	18½	17¼	18½	18	18⅜	.....	18⅝	18½	18¾	18½	6,679
Penn. Steel, pfd	100	.....	.....	70	.....	.....	.....	.....	.....	.....	.....	.....	.....	63
Susq. I & S., Pa	5	.....	.....	5⅝	.....	½	.....	⅛	.....	.....	.....	.....	.....	500
United Gas Imp.	50	81¾	80¾	82	81¼	82⅝	82⅛	82¼	81¾	82	.....	83¼	82	8 149
Warwick I. & S.	10	.....	.....	.....	.....	.....	.....	.....	.....	3⅜	3¼	3¼	3	550
Diamond Steel.	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh Navig'n	50	64¾	.....	.....	.....	65	64⅞	65	.....	.....	.....	.....	.....	406
Philadelphia....	50	37	36⅞	37	36¼	37½	36¾	37	.....	37	36¾	37½	37	4,204
U. S. Steel.....	100	11⅛	.....	11⅝	11	12¼	11⅞	11¾	11⅝	11¾	11⅛	+1.25⅝	+11⅝	13, 175
U. S. Steel. pf..	100	53¼	52⅞	54⅝	52⅞	57¼	55	56¾	55¾	57⅛	55¾	.....	.....	16, 350

†Ex-Dividend Total sales 51,315.

LONDON. Nov. 27

Name and Country of Company.	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Latest dividend. Date.	Quotations. Buyers. £ s. d.	Quotations. Sellers. £ s. d.
American:						
Alaska-Treadwell, Alaska, g.....	200,000	5 0 0	1 6	Nov., 1903	3 17 6	4 2 6
Anaconda, Montana, c. s.	1,200,000	5 0 0	2 0	Nov., 1903	3 7 6	3 12 6
Camp Bird, Colorado, g.....	820,000	1 0 0	9	Nov., 1903	1 6 3	1 7 6
Copiapo, Chile, c.....	112,500	2 0 0	6 10	May, 1903	1 2 6	1 7 6
De Lamar, Idaho, g. s.....	80,000	1 0 0	2 0	Oct., 1903	10 0	12 6
El Oro, Mexico, g. s.....	1,080,000	1 0 0	1 6	July. 1903	1 6 3	1 8 9
Frontino & Bolivia, Colombia, g. s...	128,662	1 0 0	3 0	July, 1901	7 6	10 0
Le Roi, British Columbia, g. s.....	200,000	5 0 0	5 0	Nov., 1899	16 3	18 9
Le Roi No. 2, British Columbia, g.....	120,000	5 0 0	5 0	May, 1902	1 0 0	1 2 6
Montana, Montana, g. s.....	657,128	1 0 0	6	April 1899	1 0	1 6
Standard, Arizona, c.....	500,000	4 0	2½	Sept., 1903	3 6	4 6
Stratton's Independence, Colorado, g	1,000,007	1 0 0	1 0	Aug., 1903	5 6	6 0
St. John del Rey, Brazil, g.....	546,265	1 0 0	8	Dec., 1903	15 0	16 0
Tomboy, Colorado, g.....	300,000	1 0 0	1 0	June, 1902	1 5 0	1 10 0
Utah Consolidated, Utah, c. g.....	300,000	1 0 0	6 3	July, 1903	5 15 0	6 0 0
Ymir, British Columbia, g.....	200,000	1 0 0	1 0	Mar., 1902	5 0	7 6
European:						
Linares, Spain, l.....	15,000	3 0 0	1 0	Mar., 1903	2 10 0	3 10 0
Mason & Barry, Portugal, c.....	185,172	1 0 0	11 0	May, 1903	3 7 6	3 12 6
Rio Tinto, Spain, c.....	325,000	5 0 0	32 6	Nov., 1903	48 0 0	48 5 0
Rio Tinto, pref., Spain, c.....	325,000	5 0 0	2 6	Nov., 1903	6 0 0	6 5 0
Tharsis, Spain, c.....	625,000	2 0 0	6 0	May, 1903	4 7 6	4 12 6
West Australian:						
Associated, g.....	495,388	1 0 0	2 0	July, 1903	3 2 6	3 5 0
Cosmopolitan Proprietary, g.....	400,000	1 0 0	1 0	May, 1903	17 6	18 6
*Golden Horse Shoe, g.....	300,000	5 0 0	6 0	Nov., 1903	9 0 0	9 2 6
Great Boulder Proprietary, g.....	1,750,000	2 0	9	Dec., 1903	1 9 6	1 10 0
Great Fingall Consolidated, g.....	250,000	1 0 0	8 0	Oct., 1903	9 5 0	9 7 6
Ivanhoe g.....	200,000	5 0 0	5 0	Oct., 1903	9 5 0	9 7 6
Kalgurli, g.....	120,000	1 0 0	2 6	Jan., 1904	5 8 9	5 11 3
Lake View Consols, g.....	250,000	1 0 0	rts.	Aug., 1902	1 13 9	1 16 3
Oroya-Brownhill, g.....	450,000	1 0 0	2 6	Dec., 1903	3 18 9	4 0 0
Miscellaneous:						
Brilliant Central, Queensland, g.....	100,000	1 0 0	.. 9	Nov., 1903	3 2 6	3 7 6
Briseis, Tasmania, t.....	600,000	1 0 0	.....	.....	4 3	4 9
Broken Hill Proprietary, N. S. W., s. l	900,000	8 0	1 0	Aug., 1903	1 9 0	1 10 0
Mt. Lyell, Tasmania, c.....	275,000	3 0 0	4 3	Sept., 1903	18 0	19 0
Mt. Morgan, Queensland, g.....	1,000,000	1 0 0	3	Dec., 1903	2 5 0	2 10 0
Waihi, New Zealand, g.....	497,412	1 0 0	2 6	Dec., 1903	5 0 0	5 2 6
Indian:						
Champion Reef, g..	473,000	10 0	5 6	Aug., 1903	7 15 0	7 17 6
Mysore, g.....	568,043	10 0	4 0	Nov., 1903	8 8 9	8 11 3
*Nundydroog, g.....	484,000	10 0	1 6	Nov., 1903	2 0 0	2 2 6
Ooregum, g.....	343,000	10 0	1 9	Aug., 1903	1 2 6	1 5 0
Ooregum, pref ..g.....	240,000	10 0	1 9	Aug., 1903	1 12 6	1 15 0
South African:						
Angelo, g.....	600,000	1 0 0	6 0	Aug., 1903	6 12 6	6 17 6
Bonanza, g.....	200,000	1 0 0	10 0	Aug., 1903	2 1 3	2 3 9
British South Africa.....	4,436,019	1 0 0	rts.	May, 1889	2 7 6	2 8 9
Cape Copper, c.....	300,000	2 0 0	1 0	July, 1903	2 18 9	3 1 3
Cape Copper, pref., c.....	75,000	2 0 0	1 0	July, 1903	3 0 0	3 5 0
City & Suburban, g.....	340,000	4 0 0	4 0	Aug., 1903	6 7 6	6 10 0
Consolidated Gold-Fields.....	2,000,000	1 0 0	.....	.....	5 6 3	5 8 9
*Crown Reef, g.....	120 000	1 0 0	20 0	Oct., 1903	17 0 0	17 5 0
De Beers Con., d.....	800,000	2 10 0	10 0	Aug., 1903	19 0 0	19 2 6
De Beers Con., deferred, d.....	1,000,000	2 10 0	15 0	Aug., 1903	20 10 0	20 12 6
East Rand Proprietary, g.....	390,000	1 0 0	5 0	Aug., 1903	7 5 0	7 7 6
Ferreira, g.....	90,000	1 0 0	15 0	Aug., 1903	19 15 0	20 5 0
Geldenhuis Estate, g.....	200,000	1 0 0	6 0	Aug., 1903	6 3 9	6 6 3
Geduld, g.....	400,000	1 0 0	rts.	Mar., 1902	6 15 0	6 16 3
Henry Nourse, g.....	125,000	1 0 0	10 0	Aug., 1903	8 15 0	9 0 0
Jubilee, g.....	50,000	1 0 0	5 0	July, 1903	5 0 0	5 5 0
Jumpers, g.....	100,000	1 0 0	5 0	Aug., 1899	3 10 0	3 15 0
Langlaagte Estate, g	470,000	1 0 0	3 0	Aug., 1903	3 18 9	4 1 3
May Consolidated, g.....	288,750	1 0 0	3 0	Aug., 1903	4 2 6	4 5 0
Meyer & Charlton, g	100,000	1 0 0	3 0	Aug., 1903	5 15 0	5 17 6
Modderfontein, g.....	290,000	1 0 0	rts.	Apr., 1902	9 5 0	9 7 6
Namaqua, c.....	94,331	2 0 0	2 0	June, 1903	3 5 0	3 10 0
New Jagersfontein, d	200,000	5 0 0	10 0	Nov., 1903	28 17 6	29 2 6
New Primrose, g.....	325,000	1 0 0	2 0	Aug., 1903	3 17 6	4 0 0
Rand Mines, g.....	1,795,956	5 0	4 0	Aug., 1902	9 17 6	10 0 0
Robinson, g.....	750,000	5 0 0	5 6	Aug., 1903	10 2 6	10 5 0
Robinson, Deep, g.....	950,000	1 0 0	2 0	Aug., 1903	5 11 3	5 13 9
Rose Deep, g.....	425,000	1 0 0	2 0	Aug., 1903	8 12 6	8 17 6
Salisbury, g.....	100,000	1 0 0	2 0	Mar , 1899	1 15 0	1 17 6
Sheba, g.....	1,075,000	1 0 0	6	July, 1599	13 9	16 3
Village Main Reef, g.....	400,000	1 0 0	4 0	June, 1903	7 18 9	8 1 3
Wemmer, g.....	80,000	1 0 0	10 0	July, 1903	11 2 6	11 7 6

c—Copper. d—Diamonds. g—Gold. l—Lead. s—Silver. t– Tin. *Ex-dividend. †Ex-rights.

LONDON (By Cable.)*

Name of Company.	Dec. 2. £. s. d.	Dec. 9 £. s. d.	Name of Company.	Dec. 2. £. s. d.	Dec. 9 £. s. d.
Anaconda.....	3 12 6	4 2 6	Johannesburg Invest....	2 18 9	2 18 9
British South Africa.....	2 8 9	2 16 3	Modderfontein.....	9 5 0	9 2 6
Camp Bird.....	1 6 9	1 7 6	Rand Mines.....	10 0 0	9 17 6
Con. Gold Fields.....	6 11 6	6 10 0	Rio Tinto	48 8 9	49 15 0
De Beers Con. def.....	20 15 0	20 17 6	Simmer & Jack.....	1 13 9	1 13 1½
East Rand.....	7 7 6	7 3 9	Tomboy.....	1 10 7½	1 16 10
El Oro, Mex.....	1 6 9	1 5 0	.....	.....	.....

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Nov. 19

Name of Company.	Country.	Product.	Capital Stock.	Par value.	Latest divs.	Prices. Opening.	Prices. Closing.
			Francs.	Fr.	Fr.	Fr.	Fr.
Alameda.....	California ...	Oil.....	1,000,000	1	9.50	5.50	4.50
Anzin.....	France	Coal.....	.....	.....	290.00	5,700.00	5,625.00
Boleo.....	Lower Cal....	Copper.....	12,000,000	500	62.50	1,880.00	1,710.00
Canadian-American.....	Canada.....	Coal.....	.....	20	.....	27.00	28.00
Champ d'Or.....	S. Africa.....	Gold.....	3,375,000	25	3.75	18.50	20.00
Courrieres.....	France.....	Coal.....	600,000	300	110.00	2,920.00	2,900.00
Fraser River.....	Brit. Col'mb..	Gold.....	250,000	25	.....	5.50	5.50
Huanchaca.....	Bolivia.....	Silver.....	40,000,000	125	5.00	81.75	80.75
Laurium.....	Greece.....	Zinc, Lead....	16,300,000	500	25.00	364.00	366.00
Malfidano.....	Italy	Zinc	12,500,000	500	50.00	576.00	570.00
Metaux, Cie. Fran. de.....	France	Metal dealers.	25,000,000	500	22.50	501.00	476.00
Mokta-el-Hadid.....	Algeria	Iron	18,312,000	500	40.00	834.00	835.00
Nickel.....	N. Caled'nia..	Nickel.....	15,000,000	250	22.50	481.00	470.00
Sedalia & California.....	California.....	Oil.....	1,000,000	1	.....	5.00	5.00
Vielle Montagne.....	Belgium.....	Zinc.....	9,000,000	30	30.00	675.00	669.00
Wyoming	California.....	Oil	.....	25	.....	310.00	313.00

ST. LOUIS, MO.* Dec. 5

Name.	Par Val.	Shares.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo....	$10	300,000	$0.25	$0.35
Catherine Lead, Mo.	10	50,000	1.50	2.25
Central Coal & C....	100	51,250	55.50	58.50
Central C. & C., pf..	100	18,750	67.00	71.25
Central Lead, Mo...	100	10,000	110.00	125.00

Name.	Par Val.	Shares.	Prices. Bid.	Prices. Ask.
Columbia Lead, Mo.	$10	50,000	$2.50	$3.50
Con. Coal, Ill.....	100	50,000	22.00	23.00
Doe Run Lead Co..	100	15,000	110.00	115.00
Granite Bimet. Mt..	10	100,000	.40	.50
St. Joe Lead, Mo,...	10	600,000	13.50	15.00

*By our Special Correspondent.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—	Cust.	Meas.	Price.
Carborundum, f.o.b. Niagara Falls, Powd., F. FF. FFF.	lb.		$0.08
Grains	"		.10
Corundum, N. C	"		.07@.10
Chester, Mass	"		.04½@.05
Barry's Bay, Ont	"		.07½@.09½
Mont. car-lots, f.o.b. Chicago	"		.07@.07½
Crushed Steel, f.o.b. Pittsburg	"		.05½
Emery, Turkish flour in kegs	"		.03½
Grains, in kegs	"		.05@.05½
Naxos flour, in kegs	"		.03½
Grains, in kegs	"		.05@.05½
Chester flour, in kegs	"		.03½
Grains, in kegs	"		.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"		.01½
Grains, in kegs	"		.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg. ton		26.50@30.00
Kuluk (Turkey)	"		22.00@24.00
Naxos (Greek) h. gr	"		26.00
Garnet, as per quality	sh. ton		25.00@35.00
Pumice Stone, Am. Powd	lb.		.01½@.02
Italian, powdered	"		.01½
Lump, per quality	"		.04@.05
Rottenstone, ground	"		.02½@.04½
Lump, per quality	"		.06@.20
Rouge, per quality	"		.10@.30
Steel Emery, f.o.b. Pittsburg	"		.07
ACIDS—			
Boracic, crystals	"		.10¾@.11
Powdered	"		.11¼@.11½
Carbonic, liquid gas	"		.12½
Chromic, crude	"		.20
Hydrofluoric, 30%	"		.03
48%	"		.05
60%	"		.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"		.06
ALCOHOL—Grain	gal.		2.46@2.48
Refined wood, 95@97%	"		.50@.55
Purified	"		1.25@1.30
ALUM—Lump	100 lbs.		1.75
Ground	"		1.85
Porous	"		1.00
Powdered	"		3.00
Chrome, com'l	"		2.75@3.00
ALUMINUM—			
Nitrate	lb.		1.50
Oxide, com'l, common	"		.06½
Best	"		.20
Pure	"		.80
Hydrated	100 lbs.		2.60
Sulphate, com'l	"		1.25@1.50
AMMONIA—			
Aqua, 16°	lb.		.03
18°	"		.03¼
20	"		.03¾
26°	"		.05½
AMMONIUM—			
Carbonate, lump	"		.07½
Powdered	"		.08¼
Muriate	"		.05⅝
Lump	"		.09
Nitrate, white pure (99)	"		.12
Phosphate, com'l	"		.09
Pure	"		.12
ANTIMONY—Glass	"		.30@.40
Needle, lump	"		.05½@.06
Powdered, ordinary	"		.05¾@.07¾
Oxide, com'l white, 95%	"		.03½
Com'l white, 95%	"		.12
Com'l gray	"		.07
Sulphuret, com'l	"		.16
ARSENIC—White powd	"		.03½@.03¼
Red	"		.06⅜@.06½
ASPHALTUM—			
Ventura, Cal	sh. ton		32.00
Cuban	lb.		.01½@.03½
Egyptian, crude	"		.05¼@.06
Trinidad, refined	sh. ton		35.00
San Valentino (Italian)	lg. ton		16.00
Seyssel (French), mastic	sh. ton		21.00
Gilsonite, Utah, ordinary	lb.		.03
Select	"		.03¾
BARIUM—			
Carb. Lump, 80@90%	sh. ton		25.00@27.00
92@98%	"		28.00@29.00
Powdered, 80@90%	lb.		.01¾@.02
Chloride, com'l	100 lbs.		1.67½@1.76
Chem. pure cryst	lb.		.05
Nitrate, powdered	"		.05⅞

BARIUM	Cust.	Meas.	Price.
Sulphate (Blanc Fixe)	lb.		$0.02
BARYTES—			
Am. Crude, No. 1	sh. ton		9.75
Crude, No. 2	"		8.00
Crude, No. 3	"		7.00
Floated	"		18.50
Foreign gray	"		13.50
Snow white	"		17.25
Floated	"		18.75
BAUXITE—Ga. or Ala. Mines:			
First grade	lg. ton		5.50
Second grade	"		4.75
BISMUTH—Subnitrate	lb.		2.00
Subcarbonate	"		2.25
BITUMEN—"B"	"		.03½
"A"	"		.05
BONE ASH	"		.02½@.02½
BORAX	"		.07¼@.07½
BROMINE—Bulk	"		.48
CADMIUM—Metallic	"		1.40
Sulphate	100 lbs.		2.00@2.50
CALCIUM—Acetate, gray	"		1.40
" brown	"		.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton		70.00
Carbonate, ppt	lb.		.05
Chloride	100 lbs.		.70@.90
CEMENT—			
Portland, Am., 400 lbs	bbl.		1.50@1.75
Foreign	"		1.75@2.25
"Rosendale," 300 lbs	"		.85
Slag cement	"		1.25@1.50
CERESINE—			
Orange and Yellow	lb.		.13
White	"		.14
CHALK—Lump, bulk	sh. ton		3.00
Ppt. per quality	lb.		.04@.05¼
CHLORINE—Liquid	"		.30
Water	"		.10
CHROME ORE			
(50% ch.) ex-ship N. Y.	lg. ton		24.75
Bricks f.o.b. Pittsburg	M		175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg. ton		8.25
Am. best, ex-dock, N. Y.	"		9.25
English, common	"		10.75
Best grade	"		16.50
Fire Clay, ordinary	sh. ton		4.25
Best	"		6.00
Slip Clay	"		5.00
COAL TAR PITCH	gal.		.08
COBALT—Carbonate	lb.		1.75
Nitrate	"		1.50
Oxide—Black	"		2.26@2.30
Gray	"		2.28@2.40
Smalt, blue ordinary	"		.06
Best	"		.20
COPPERAS—Bulk	100 lbs.		.47½
In bbls	"		.52½
COPPER—Carbonate	lb.		.18@.19
Chloride	"		.25
Nitrate, crystals	"		.35
Oxide, com'l	"		.19
CRYOLITE	"		.06½
EXPLOSIVES—			
Blasting powder, A	25-lb. keg		.65
Blasting powder, B	"		1.40
"Rackarock," A	lb.		.25
"Rackarock," B	"		.18
Judson R.R. powder	"		.10
Dynamite (20% nitro-glycerine)	"		.13
(30% nitro-glycerine)	"		.14
(40% nitro-glycerine)	"		.15
(50% nitro-glycerine)	"		.16½
(60% nitro-glycerine)	"		.18
(75% nitro-glycerine)	"		.21
Glycerine for nitro (32-2-10° Be.)	"		.12½@.12⅝
FELDSPAR—Ground	sh. ton		8.00@9.00
FLINT PEBBLES—Dan. Best	lg. ton		14.75
French, Best	"		11.75
FLOURSPAR—			
Am. lump, 1st grade	sh. ton		14.40
2d grade	"		13.90
Gravel and crushed, 1st gr.	"		13.40
2d grade	"		12.40
Ground, 1st grade	"		17.90
Ground, 2d grade	"		16.50
Foreign, lump	"		8.00@12.00
Ground	"		11.50@14.00
FULLER'S EARTH—Lump	100 lbs.		.80
Powdered	"		.85

GRAPHITE—Am. f.o.b. Providence, R. I., lump	Cust. sh. ton	Meas.	Price. $8.00
Pulverized	"		30.00
Am. pulv., other than R. I., f. o. b., New York	"		45.00
Best flake	"		150.00
German, com. pulv	lb.		.01¼@.01½
Best pulverized	"		.01½@.02
Ceylon, common pulv	"		.02¾@.03¼
Best pulverized	"		.04@.08
Italian, pulv	"		.01¼
GYPSUM—Ground	sh. ton		8.00@8.50
Fertilizer	"		7.00
Rock	lg. ton		4.00
English and French	"		14.00@16.00
INFUSORIAL EARTH—Gr'd.			
American best	"		20.00
French	"		37.50
German	"		40.00
IODINE—Crude	100 lbs.		2.45
IRON—Muriate	lb.		.05
Nitrate, com'l	"		.01¼
True	"		.04
Oxide, pure copperas color	"		.05@.10
Purple-brown	"		.02
Venetian red	"		.01@.01½
Scale	"		.01@.03
KAOLIN—(See China Clay.)			
KRYOLITH—(See Cryolite.)			
LEAD—Acetate, white	"		.08¼@.08½
Brown	"		.06¼@.06½
Nitrate, com'l	"		.06½
" gran	"		.08¼
LIME—Com., abt. 250 lbs	bbl.		.80
Finishing	"		1.02
MAGNESITE—Greece.			
Crude (95%)	lg. ton		5.00@5.50
Calcined	sh. ton		15.50
Bricks, best imp., f.o.b. N.Y.	M.		155.00
" domes., per qual., f.o.b. Pittsburg	"		160.00@200.00
MAGNESIUM—			
Carbonate, light, fine pd	lb.		.05
Blocks	"		.07@.09
Chloride, com'l	"		.01¾
Fused	"		.20
Nitrate	"		.60
Sulphate	100 lbs.		.75@.95
MANGANESE—			
Crude powd.			
70@75% binoxide	lb.		.01¼@.01½
75@85% binoxide	"		.01½@.02¼
85@90% binoxide	"		.02¼@.03¼
90@95% binoxide	"		.03¼@.05½
Carbonate	"		.16@.20
Chloride	"		.04
Ore	unit		.18@.20
MARBLE—Flour	sh. ton		6.00@7.00
MERCURY—Bichloride	lb.		.77
MICA—N. Y. gr'nd, coarse	sh. ton		33.00@38.00
Fine	lb.		.00⅞@.02
Sheets are sold as to size and quality			
MINERAL WOOL—			
Slag, ordinary	sh. ton		19.00
Selected	"		25.00
Rock, ordinary	"		32.00
Selected	"		40.00
NICKEL Oxide, No. 1	lb.		1.00
No. 2	"		.60
Sulphate	"		.20@.21
OILS—Black, reduced 29 gr.:			
25@30, cold test	gal.		.13@.13½
15, cold test	"		.14@.14½
Zero	"		.18½@.19
Summer	"		.13@.13½
Cylinder, dark steam ref	"		.14½@.15½
Dark, filtered	"		.18½@.19
Light, filtered	"		.20½@.21
Extra cold test	"		.25@.31
Gasoline, 86 @90°	"		.17@.22
Naphtha, crude, 68°@72°	bbl.		12.40
"Stove"	gal.		.15
Linseed, domestic raw	"		.36@.37
Boiled	"		.39
Calcutta, raw	"		.65
OZOKERITE	lb.		.11½
PAINTS AND COLORS—			
Chrome green, common	"		.03
Pure	"		.16
Yellow, common	"		10¼
Best	"		.14
Lampblack, com'l			.04½
Refined			.07
Litharge, Am. pow'd			.05@.05½
English flake	"		.08¼@.08½
Glassmakers'	"		.06½@.08¼

PAINTS AND COLORS—	Cust.	Meas.	Price.
Metallic, brown	sh. ton		$19.00
Red	"		16.00
Ocher, Am. common	"		8.50@ 9.00
Best	"		21.25@25.00
Dutch, washed	lb.		.03
French, washed	"		.01½@.01⅝
Orange mineral, Am	"		.07½
Foreign, as to make	"		.06¾@.10½
Paris green, pure, bulk	"		.11
Red lead, American	"		.05¾@.06
Foreign	"		.06½@.07¼
Turpentine, spirits	gal.		.59 @.59½
White lead, Am., dry	lb.		.04½@.04¾
American, in oil	"		.05½@.06½
Foreign, in oil	"		.07 @.09
Zinc, white, Am., ex. dry	"		.04⅝@.04¾
Foreign, red seal, dry	"		.06@.08½
Green seal, dry	"		.06¼@.09½
POTASH—			
Caustic, ordinary	"		.04½@.04⅞
Elect. (90%)	"		.06¼
POTASSIUM—			
Bicarbonate cryst	"		.08¼
Powdered or gran	"		.14
Bichromate, Am	"		.08½@.08¼
Scotch	"		.08½@.09
Bromide	"		@.30
Carbonate (80@85%)	"		.03¼@.04⅜
Chlorate, powd	"		.06¾@.07¼
Crystals	"		.06¼@.07
Chromate	"		.35
Cyanide (98@99%)	"		.20
Kainit	lg. ton		9.30
Manure salt, 20%	100 lbs.		.66
D'le Manure Salt, 48@53%	"		1.12
Muriate, 80@85%	"		1.83
95%	"		1.86
Permanganate	lb.		.09¼@.09⅝
Prussiate, yellow	"		.14¾@.14¾
Red	"		.36
Sulphate, 90%	100 lbs.		2.11
96%	"		2.14
Sylvanit	unit		.41
QUARTZ—(See Silica).			
SALT—N. Y. com. fine 280 lbs	bbl.		.72@1.18
N. Y. agricultural	sh. ton		4.40
SALTPETRE—Crude	100 lbs.		3.35@3.40
Refined	"		4.00@4.50
SILICA—Best foreign	lg. ton		10.00@11.00
Ground quartz, ord	sh. ton		6.00@8.00
Best	"		12.00@13.00
Lump quartz	"		2.50@4.00
Glass sand	"		2.75
SILVER—Chloride	oz.		.65
Nitrate Crystals	"		.36½
Oxide	"		.85@1.10
SODIUM—			
Bicarb., ord., bulk f.o b. wk's.	100 lbs.		1.25
Extra domes., f.o.b. w'ks	"		3.50
Foreign, f.o.b. N. Y	"		1.75
Bichromate	lb.		.06¼
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.		.72½@.80
Foreign, f.o.b. N. Y	"		.90@.92½
Caustic, 70@76%, f.o.b. w'ks	"		1.75@1.80
" 60%	"		1.85@1.90
Foreign, f.o.b N. Y	"		1.90@1.95
Chlorate, com'l	"		.06¾@.07
Hyposulphite, Am	"		1.60@1.65
German	"		1.70@1.90
Nitrate, spot	"		2.25
Shipments	"		2.00@2.10
Peroxide	lb.		.45
Phosphate	"		.02¼@.02¾
Prussiate	"		.10¼
Sal soda, f.o.b. works	100 lbs.		.60
Foreign, f.o.b. N. Y	"		.67½
Silicate, conc	lb.		.05
Com'l	"		.01
Sulphate, com'l	100 lbs.		.82½
Sulphide	lb.		.01¾
Sulphite crystals	"		.02½
SULPHUR—Roll	100 lbs.		1.85
Flour	"		1.90
Flowers, sublimed	"		2.25
TALC—N. C., 1st grade	sh. ton		20.00
N. Y., Fibrous, best	"		10.28
French, best	100 lbs.		2.00
Italian, best	"		2.25
TAR—Regular	bbl.		2.70
Oil, bbl	"		4.60
TIN—Crystals, bbl	lb.		.20
Oxide	"		.35
URANIUM—Oxide	"		2.25@3.00
ZINC—Metallic, ch. pure	"		.07@.09%
Carbonate, ppt	"		.09
Chloride solution, com'l	"		.02¼
Chloride granular	"		.15
Dust	"		.04¾@.04⅞
Sulphate	"		.02½@.02¾

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.35
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07¼@.08¼
THORIUM—Nitrate 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
YTTRIUM—Nitrate	lb.	40.00
ZIRCONIUM—Nitrate	"	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.